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**SUITABILITY OF MRP II TO MATERIAL PLANNING FOR COMPONENT REPAIR AT NAVAL AVIATION DEPOT, NORTH ISLAND**


by

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# SUITABILITY OF MRP II TO MATERIAL PLANNING FOR COMPONENT REPAIR AT NAVAL AVIATION DEPOT, NORTH ISLAND

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## ABSTRACT

Manufacturing Resource Planning (MRP II) is being implemented at Naval Aviation Depot, North Island (NADEP NI) to combat chronic material deficiencies. MRP II is a planning tool designed for scheduling manufacturing activities with known demand. NADEP NI is a job shop component repair facility with component forecast error ranging up to 800 percent, making the suitability of MRP II questionable. This research studies material planning at NADEP NI to identify forecast error, probability of part replacement error, and material lead-time variability in order to make recommendations for success in implementing MRP II. Fifteen percent of requisitions for work-in-process components are between one and two years old. If lead-times are reduced to a maximum of one year, the planning horizon can be reduced. Work-in-process inventories can also be reduced by 2.3 million dollars based on 26 components sampled from the top revenue generators. Currently material is ordered five weeks prior to the repair quarter. Ordering material when the forecast is generated can reduce work-in-process inventories by 6.2 million dollars for the sample components.

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## LIST OF ACRONYMS

| | |
|---|---|
| AIMD | Aviation Intermediate Maintenance Depot |
| AWI | Awaiting Induction |
| AWP | Awaiting Parts |
| BOM | Bill of Material |
| BRAC | Base Realignment and Closure |
| CRC | Component Repair Conference |
| DDDC | Defense Distribution Depot, California |
| DLA | Defense Logistics Agency |
| DLR | Depot Level Repairable |
| DoD | Department of Defense |
| DOP | Designated Overhaul Point |
| DSP | Designated Support Point |
| FIC | Family Identification Code |
| FISC SD | Fleet and Industrial Supply Center, San Diego |
| IIC | Item Identification Code |
| MRP II | Manufacturing Resource Planning |
| MRP | Material Requirements Planning |
| NADEP NI | Naval Aviation Depot, North Island |
| NADEP | Naval Aviation Depot |
| NAVAIR | Naval Air Systems Command |
| NAVICP-Phil | Navy Inventory Control Point - Philadelphia |

| | |
|---|---|
| NAVSUP | Naval Supply Systems Command |
| NIIN | Navy Item Identification Number |
| NIMMS | NAVAIR Industrial Material Management System |
| NRFI | Not Ready For Issue |
| OST | Order and Shipping Time |
| RF | Replacement Factor |
| RFI | Ready For Issue |
| RTAT | Repair Turnaround Time |
| TAT | Turnaround Time |
| UA | United Airlines |
| UAMOC | United Airlines Maintenance Operations Center |

# I. INTRODUCTION

## A. PURPOSE

Current naval doctrine is focused on littoral warfare and power projection over the horizon ashore. Air power through the deployment of carrier battle groups and amphibious ready groups is critical to the Navy's ability to meet that vision. Aviation readiness is directly linked to the ability of Naval Aviation Depots (NADEPs) to meet component repair requirements and to keep the fleet supplied with high quality repair parts. NADEP's ability to manage the Not Ready for Issue (NRFI) repair process has a tremendous impact on turnaround time (TAT), component pipeline inventory, repair costs, and fleet readiness.

NADEPs have been under increasing pressure to improve the efficiency and effectiveness of their processes. Through Base Realignment and Closure (BRAC), the Navy has reduced the number of active NADEP's to three. Popular emphasis on privatizing and outsourcing non-core functions and the expectation of another round of BRAC has put added pressure on NADEPs to improve their efficiency in order to ensure their long-term viability. In addition, shrinking defense budgets limit large scale acquisition programs and have caused defense contractors to expand their focus to the maintenance arena as a means of securing defense contracts. This added competition increases the pressure on the NADEP'S to improve their efficiency.

As a means of improving efficiency and the ability to meet customer requirements, Naval Aviation Depot, North Island, California (NADEP NI) is committed to improving the component repair process. As a result, NADEP NI is implementing a resource planning system. The goal is to improve the overall ability to schedule and manage all resources and to maximize efficiency and productivity.

Material Requirements Planning (MRP) is a management philosophy that focuses the planning of material requirements to an identified production objective. The goal is to ensure materials are in place in time to meet production requirements without interruption to the schedule. Failure to provide the right materials to the production line when needed slows the production process, increases TAT, increases costs, and degrades the quality of the product and/or service provided to the customer.

Advancements in computer and information technology enabled MRP to be expanded to cover planning of other resources, not just material requirements. These resources include labor requirements, equipment capacity, plant facilities, transportation, warehousing, information management, etc. The underlying tenet of resource planning is establishing a master schedule and having a robust information management system capable of adjusting resource planning requirements in concert with adjustments to the master schedule. This refinement of MRP is referred to as Manufacturing Resource Planning and is commonly called MRP II.

Traditional defense supply support is predicated on establishing inventory profiles that are demand based. Such systems are focused on historical demand and are not responsive to forecasted changes in demand. Because these systems focus on the past, they generally lag actual demand. This partially explains the accumulation of obsolete material and the lack of consistency of getting the right material to the customer in time to meet their requirements. If inventory levels are determined by looking to production history, is it possible to quickly adjust inventory profiles in response to changes in forecasted production? This research will examine this question and it's impact on MRP II in the component repair environment.

MRP II requires an accurate forecast of requirements in order to be effective. The forecast horizon must exceed the longest material lead-time in order to achieve accurate resource planning. A master production schedule can then be established based on this forecast. Once a master production schedule is established, resource planning is focused on meeting the master schedule. In order for MRP II to work effectively, functions and processes that impact the production schedule must occur on time with a high degree of confidence. Variability in any phase of planning reduces the chances of meeting the master production schedule. This same principle applies to the schedule itself. If the forecast is not accurate, then the master schedule can not be expected to be accurate. Any variability in the forecast, production schedule, or in any aspect of resource planning diminishes the probability that the goals of the master schedule will be met. Variability in the forecast causes a domino effect in the resource planning. Supporting activities go into crisis mode in order to support changes to the production schedule making it more difficult to meet the due date. These attempts to play catch-up in the planning cycle result in cost overruns and schedule delays.

## B. OBJECTIVE

The purpose of this research is to analyze the component repair process at NADEP NI and to determine if the implementation of MRP II can enhance that process with respect to material requirements planning. Currently, when

NADEP NI cannot complete repair on a not-ready-for-issue (NRFI) component (categorized as F condition) due to unreceived parts, the component goes into an awaiting parts status known as G condition. The average time that components are in G condition at NADEP NI is an average of 192 days. NADEP NI currently has more than 163 million dollars worth of components in G condition waiting on more than 17 million dollars worth of parts. In addition, the G condition inventory adds significantly to the pipeline inventory investment that the Navy must fund. This condition also degrades aircraft overhaul processes and hurts fleet readiness.

The current method of parts procurement does not adequately support the repair process. In this light, NADEP NI is in the process of implementing MRP II as a means of improving the repair process and also to improve material availability to support this process. The question is raised whether current Department of Defense (DoD) processes are suitable to support that effort and whether any modification in the system or in the MRP II implementation is warranted. This research examines the requirements of an effective MRP II process relative to current DoD practices, including forecasting component repair inductions, identifying material requirements, and in the ability of the supply system to deliver material in time to meet production schedules. This research also makes recommendations for improving the process in order to reduce component repair turnaround time, to reduce pipeline inventory, and to reduce production costs. The goal of this analysis is to improve the repair process at NADEP NI. It also has applications to the Fleet and Industrial Supply Center, San Diego, California (FISC SD), as the primary supplier for parts in the repair process at NADEP NI and to the Navy Inventory Control Point, Philadelphia, Pennsylvania (NAVICP-Phil), as the owner of the components being repaired.

## C. RESEARCH QUESTIONS

This research addresses the following research questions:

- What are the current forecasting criteria for component induction?
- How much variation is there between forecasted and actual component induction?
- How are material requirements for a specific component determined and what is the variability in material requirements for component repair?
- What is the order and shipping time (OST) for parts needed for a specific component repair when requisitioned through the Navy supply system?
- What is the variability in order and shipping time (OST) and how does that impact the component repair process?

- How can current material planning processes be improved in order to facilitate the component repair processes, reduce turnaround time, and to better utilize MRP II?

## D. SCOPE, LIMITATIONS, AND ASSUMPTIONS

This thesis is an analysis of whether the current supply system has the capabilities to effectively support the implementation of MRP II at NADEP NI. There are approximately 30,000 components in NADEP NI's database for which there is historical data. Of these, approximately 3,500 make up NADEP NI's active component workload. Of these active components, approximately eighty percent of NADEP NI's revenue generation is attributed to 260 families of components. The focus of this research is on these 260 component families. Ten percent of the revenue generators or 26 components are randomly selected for analysis.

An analysis of the repair process is conducted to determine variability in the overall process. The analysis looks at forecasted inductions, parts requirement identification, and total logistics delay time for the component repair process. The intent is to identify variability in each individual facet and then in the total process and to determine the impact of such variability on the ability to successfully implement MRP II. Potential process enhancements and improvements are also examined to determine possible quality improvements in implementing MRP II.

Processes at United Airlines (UA) are used for comparison purposes with NADEP NI and to determine possible enhancements that may be applicable to NADEP NI and also to identify cultural barriers in the Navy that might impede MRP II implementation.

The research focuses on 26 randomly selected components from the population of components, which are the top revenue generators for NADEP NI. The results of the research are assumed to be applicable to the general population of components. The findings of the specified components are considered to be indicative of the processes that control all component repair and, therefore, conclusions can be applied to these processes overall.

The findings of this research document the ability of the existing supply system to support the implementation of MRP II. Therefore, the conclusions have applicability to NADEP NI's implementation planning so that processes can be modified to improve efficiency. In addition, the research provides answers to the fundamental question of whether the existing supply system is sufficiently flexible to support initiatives that are deemed necessary to improve efficiency and cost effectiveness of depot repair processes, i.e. MRP

II. This has implications regarding policy decisions by Naval Air Systems Command (NAVAIR), NAVICP-Phil, and Naval Supply Systems Command (NAVSUP) regarding the future of the Navy's supply system and support provided to all NADEPs.

## E. ORGANIZATION OF RESEARCH

The methodology used in this thesis research consists of the following steps:

- Conduct a literature search of books, periodical articles, CD-ROM systems, and other library information resources for background information.
- Visit NADEP NI to observe operations, examine current practices, and collect data on current component repair planning and production.
- Visit United Airline's maintenance hub at San Francisco airport focusing efforts on examining the component repair facility to observe operations, examine industry practices, and discuss process issues.
- Prepare a baseline assessment to document current repair processes at NADEP NI and make comparisons to those practices employed at United Airline's maintenance hub.
- Determine the minimum supply system performance parameters required to meet the production goals of MRP II at NADEP NI.
- Determine the current levels of performance regarding logistics support at NADEP's component repair process.
- Identify bottlenecks to desired MRP II goals within the current supply system.
- Determine the likelihood of meeting desired MRP II goals using the current supply system.

- Make recommendations to decrease or eliminate the bottlenecks and identify expected benefits to turnaround time and pipeline inventory.

- Make recommendations on findings.

## F. ORGANIZATION OF THESIS

The approach to conducting the research begins with an overview of MRP II and how it will be implemented at NADEP NI. This will include a review of the expected benefits to NADEP NI and the critical paths to successful implementation, including barriers and bottlenecks. A comparison is conducted between United Airlines' maintenance facility at San Francisco airport and NADEP NI to highlight differences in organizational structure and processes. Once the basic organizational processes are identified, 26 components are identified that typify NADEP NI's component repair process. The maintenance and material requirement histories for those components are studied to identify variability in the process and to focus on areas that can be improved to better support MRP II. Finally, conclusions and recommendations are provided for improving supply support for improving the implementation of MRP II at NADEP NI, reducing repair costs, reducing repair turn around time, and reducing component pipeline inventory. The research concludes with recommendations for further research on this issue.

# II. MANUFACTURING RESOURCE PLANNING (MRP II)

## A. EVOLUTION OF MRP II

MRP was first introduced to manufacturing as a means of managing material procurement and delivery to ensure that material was received in time to meet identified production schedules. However, the ability to deliver the goods on time was only as good as the initial schedule and the likelihood that the schedule would not vary, or if it did, that the changes were provided to the material managers in time to adjust material due dates.

Unfortunately, schedule variation leads managers and supervisors at various levels of an organization to develop their own work-arounds in order to offset the shortcomings of an invalid or rapidly changing schedule. Expedite lists, shortage lists, excessive material handling, double ordering, and the use of exaggerated ordering priorities as insurance against schedule variation are all means of dealing with an unreliable production schedule. In short, ineffective systems breed more systems.

With rapidly improving information technology, the scheduling problem becomes much more manageable. If a computer-based master schedule is developed and tied to resource planning, including labor, material management, procurement, transportation, facilities requirements, etc., adjusting resource requirements becomes much easier to manage. One adjustment in the master schedule can trigger appropriate adjustments in the resource planning of any and all resources. Schedule changes must be distributed to all the players and computer technology provides the means to do that. However, unless the schedule is valid, the customer's requirements will not be met.

Expanding the management processes to include all production resources changed Material Requirements Planning (MRP) into Manufacturing Resource Planning (MRP II). This expansion is possible through the development of advanced information technology.

MRP II allows all facets of an organization to plan based on the same schedule and the same information. It allows production, inventory managers, purchasing, schedulers, and customers to plan their activities based on the same master schedule. The operating and financial systems are, in effect, one and the same. MRP II also allows "what if" scenarios to be examined to determine the impact of hypothetical policy changes or schedule adjustments. Figure 2-1 diagrams an effective MRP II system.

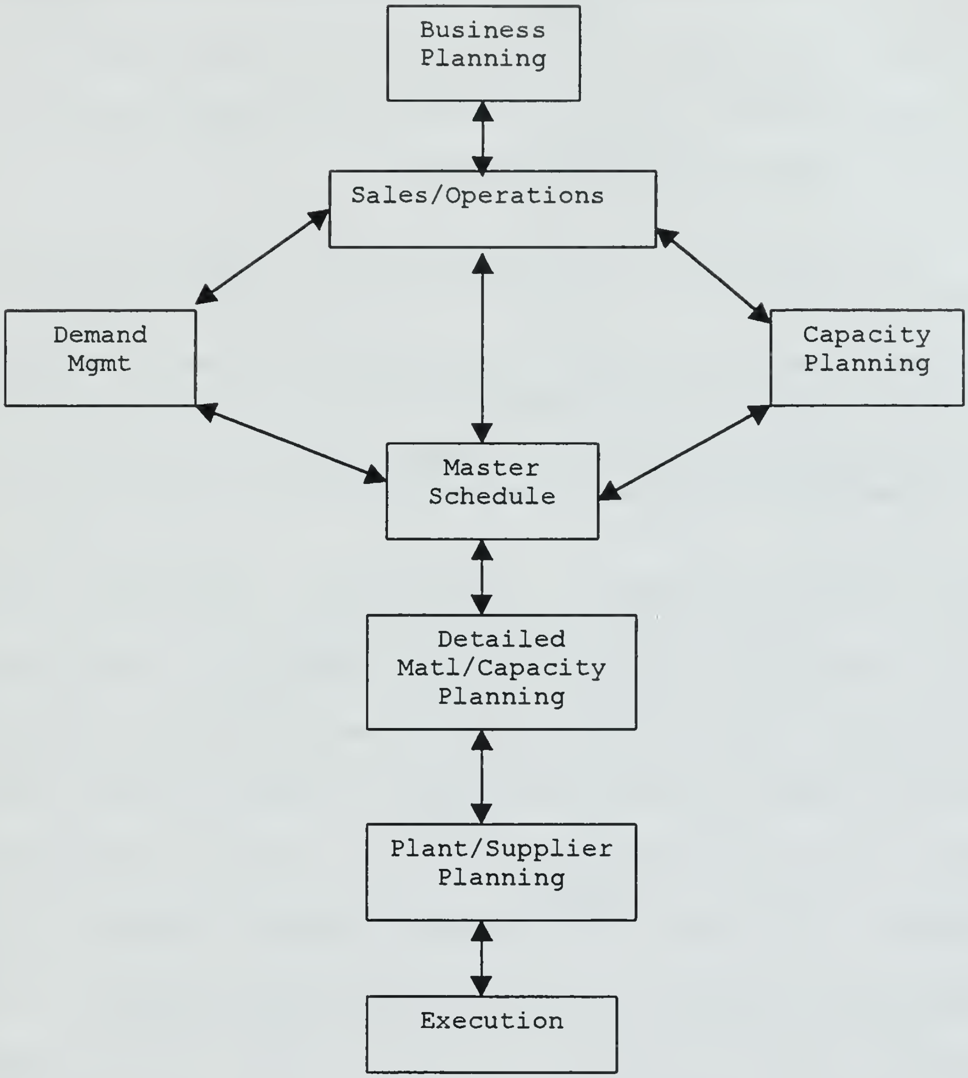


Figure 2-1. Manufacturing Resource Planning (MRP II)

## B. APPLICATIONS AND BENEFITS OF MRP II

### 1. Applications of MRP II

As indicated in Figure 2-1, the driver in MRP II is business planning. Knowing the customer and the customer's needs is paramount to effective business planning. This is the basis for developing an effective marketing strategy, and, in turn, for identifying the products that need to be produced and the date required. MRP II has applications to the following types of organizations:

1. An organization that manufactures a make-to-stock product,

2. An organization that manufactures a short delivery lead time make-to-order product, and

3. An organization that manufactures a long delivery lead time make-to-order product.

These categories mark a significant deviation from NADEP NI's production environment. NADEP NI's component repair process is not the same as a manufacturing process and therefore cannot easily be placed in any of these three categories. In a manufacturing process, a unit is produced from scratch. All units of the same product require the same combination of parts in the manufacturing process. In the component repair process, ten repair jobs for the same component can require ten different combinations of replacement parts to return those components to A condition status. Figures 2-2 and 2-3 highlight the differences between a traditional MRP II environment and the environment at NADEP NI.

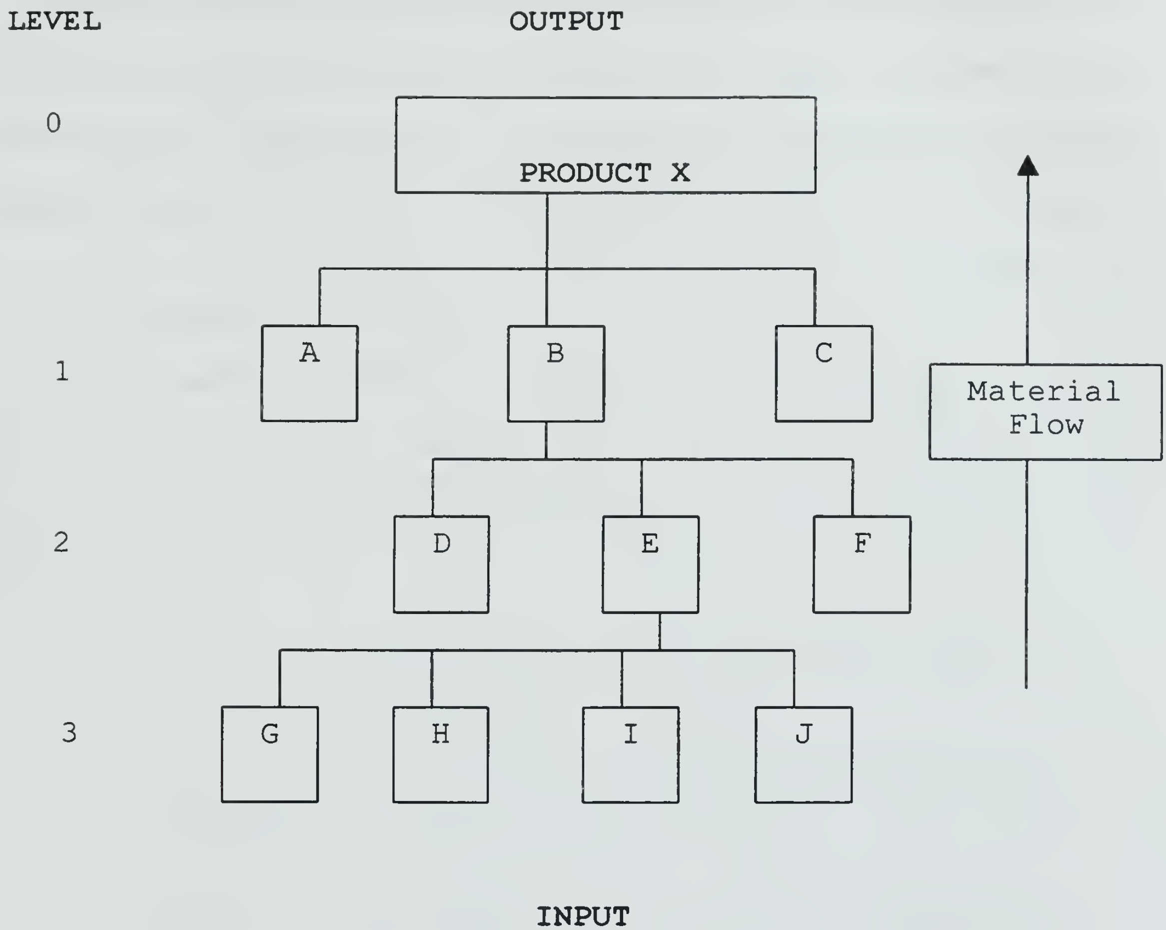


Figure 2-2. Traditional MRP II Product Structure

Figure 2-2 shows the traditional product structure under MRP II. The product does not vary and the same parts are utilized in the same combination every time the product is manufactured. This is in stark contrast to Figure 2-3, which shows the repair process structure for a component at NADEP NI. Material requirements vary for the same component depending on the degree of repair required for that particular unit. Any combination of individual parts or subassemblies might require replacement during the process. Hence, there is much more variability in material requirements for a repair process versus a manufacturing process.

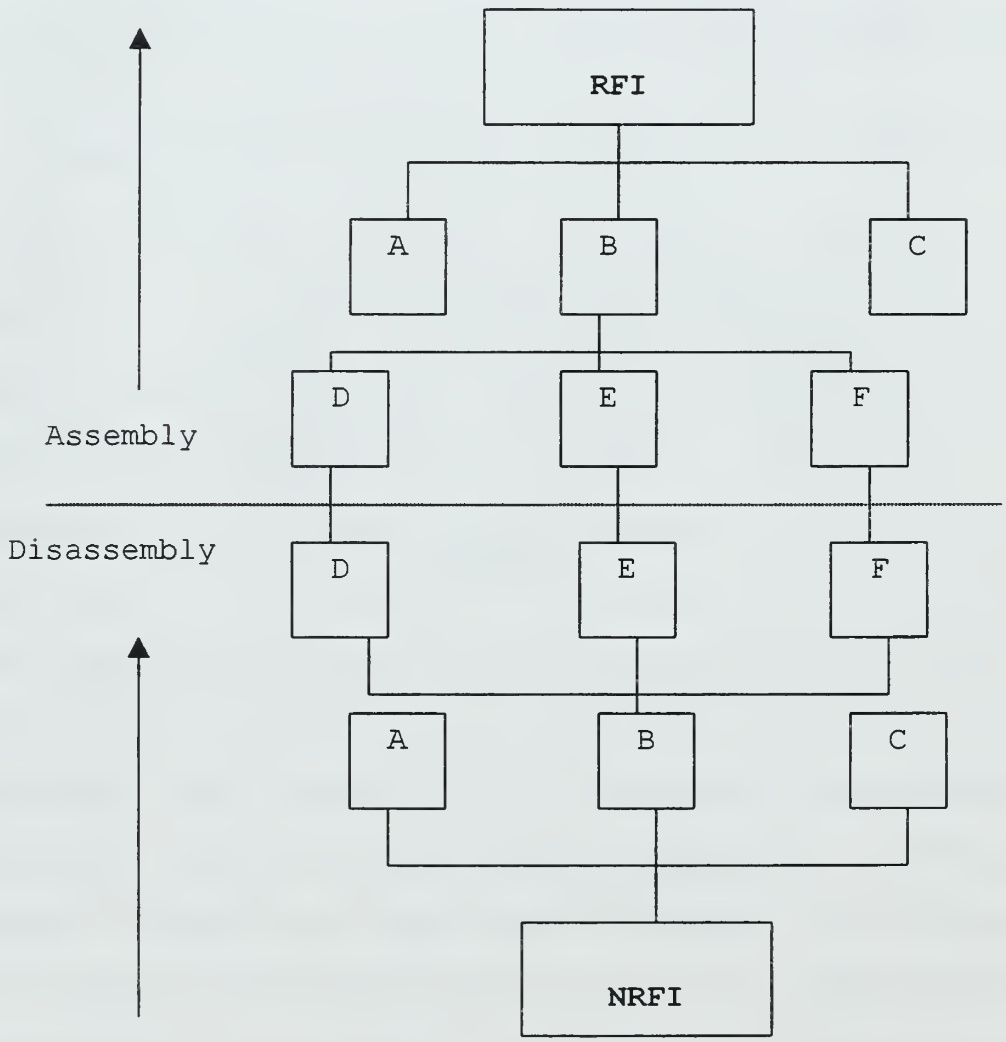


Figure 2-3. NADEP NI Component Repair Structure

NADEP NI's finished products can either be put back in inventory, sent to the fleet to fill an immediate requirement, or utilized in aircraft overhaul processes at NADEP NI.

### 2. Benefits of MRP II

The degree of MRP II implementation can vary widely from one organization to another. The degree to which an organization has achieved implementation is categorized into four classes:

1. Class A - MRP II is used so effectively there is no shortage list.
2. Class B - MRP II has a very good production and inventory control system, but has not extended it to the entire organization.
3. Class C - MRP II is used as a better inventory control system and is used for order launching.
4. Class D - MRP II is primarily used as a data processing system with little impact on operations.

As an organization reaches higher levels of MRP II implementation, productivity gains are more prevalent. The overall effect is to smooth production rates. When production rates become more stabilized, the result is reduced waste and an organization with far more flexibility, allowing rapid response to changes in demand.

Since inventories are maintained as insurance against unforeseen production requirements, inventory reduction is a by-product of stabilized production. Again, this can be attributed in part to maintaining a viable, up-to-date schedule. Additional productivity improvements are possible in budgeting, purchasing, inventory management, labor management, overtime reduction, improved quality control, and better customer service.

For the purpose of this research, only forecasting, material planning, and OST aspects of resource planning are studied. Improving these areas of production support has tremendous potential to improve NADEP NI's overall performance since NADEP NI has over 163 million dollars worth of components in G condition waiting on over 17 million dollars worth of parts.

### C. MRP II IMPLEMENTATION AT NADEP NI

NAVAIR is aggressively pursuing the implementation of MRP II at all NADEPs in an effort to improve cost and schedule performance. This dictates that the NADEPs must switch from a historical-based resource management method to a forecast-based management philosophy. The planning horizon must exceed that of the longest material lead-time and the mechanisms that ensure material availability must be put in place.

The process value chain requires contributions from several activities, including NAVAIR, NAVICP-Phil, FISC SD, Defense Logistics Agency (DLA), and NADEP NI. All must be committed to making changes in their current processes and operations in order to ensure the success of MRP II.

NADEP NI is in the process of preparing for MRP II implementation and is scheduled to go live with this system by 1 October 1998. The instrument shop (shop 3606) will be the first shop to go live on 1 October. Implementation in the six remaining shops is time phased from January 1999 through April 2000. This phased approach is intended to allow required processes, information management systems and interfaces, training, material requirements, and organizational interfaces to be put in place prior to bringing each shop on line. A phased approach eases the management of the implementation process and reduces learning time in later shops.

MRP II implementation is part of a broader initiative that is designed to incorporate financial management, tool inventory management, data management, facilities and equipment management, inter-service material accounting, and other management systems in order to allow total resource management.

The expected benefits to NADEP NI as taken from NADEP NI's Depot Maintenance System Concept of Operations include accurate forecasts of depot workload and effective management of internal resources. However, MRP II stresses that accurate forecasts of depot workload should not be considered a benefit to be derived, but rather a specific prerequisite for the successful implementation of MRP II. A stable forecast will certainly allow more effective workload and resource scheduling, but it cannot be considered a metric with which to evaluate the success of the implementation process. Specific benefits expected include the ability to:

- Forecast total depot workload and manage availability of material, skills, facility equipment, and tool inventories;
- Plan, design, develop work packages and schedule all production efforts;
- Collect data against the plan in terms of both labor hours and material usage by operation or activity as defined by production management;
- Review and negotiate workloads and establish budgets for forecasted workloads; and
- Account for costs and financially track the status of all funded workload against a budget.

The incremental deployment strategy is critical to the success of the system implementation. From the depot management perspective, expected benefits include improved ability to:

- Make long term projections allowing higher quality strategic decisions regarding resource investments;
- Support the Navy/DoD budget process;
- Identify performance problems early;
- Capture and store data directly related to a component for maintenance program analysis;
- Reduce depot operating costs by improving practices; and
- Reduce component turnaround time through improved scheduling and resource management.

As indicated earlier, several organizations play a critical role in the success of MRP II implementation at NADEP NI. NAVICP-Phil, as the owner of the components to be repaired, must provide NADEP NI with an accurate forecast of components to be inducted into the repair process. NAVICP-Phil is a stakeholder in making the process more efficient since reducing repair turnaround time (RTAT) can help reduce component pipeline inventory investment funded by NAVICP-Phil. Since a reliable induction forecast is a prerequisite to achieving accurate resource planning, NAVICP-Phil's role is critical to successful implementation.

NAVAIR is responsible for maintaining the Navy's aviation industrial capability. NAVAIR is the source of funding for the NADEPs and is highly concerned with preserving the Navy's depot system. Threats to the long-term viability of the NADEPs include the expectation of a third round of BRAC and pressure to outsource and privatize depot functions. In addition, the decreasing defense budget pressures major claimants to reduce Operations and Maintenance, Navy (O&MN) funding requirements in order to fund weapon system development and procurement for capital investment. For these reasons, NAVAIR is a major stakeholder in NADEP NI's ability to improve efficiency and productivity. NAVAIR influences the NADEPs by instituting policy and thus has an impact on the implementation of MRP II and its outcome.

FISC SD and DLA are also stakeholders. FISC SD is NADEP NI's liaison for supply matters with responsibilities that include inventory management of end-use material, material procurement, and management of G condition components. DLA owns the majority of the parts that are required for component repairs. Acceptable OST for these items is a critical requirement for successful MRP II implementation.

These organizations have competing interests and are rewarded and incentivized differently. These competing interests could provide barriers and hurdles to the successful implementation of MRP II.

# III. BUSINESS PRACTICES AT NADEP NI AND UNITED AIRLINES MAINTENANCE OPERATIONS CENTER

## A. INTRODUCTION

This chapter examines the repair processes at both NADEP NI and United Airlines Maintenance Operations Center (UAMOC) to identify current practices at both facilities and to compare and contrast those practices. The author acknowledges that there are significant differences in performance motivation between these two organizations. As a Navy Working Capital Fund (WCF) activity, NADEP NI must complete its mission in a manner that produces a Net Operating Result (NOR) of zero by the end of the fiscal year. NADEP NI must recover all costs without producing a profit. UAMOC, on the other hand, must complete the same basic function as NADEP NI in a manner that maximizes profit for United Airlines. However, both organizations operate in job shop environments with the purpose of returning NRFI aviation components to RFI condition.

With this in mind, it is useful to examine the practices of the two in order to identify areas within NADEP NI for possible improvement. To identify differences in OST between the two organizations, the examination of business practices focuses on forecasting component induction demand, estimating parts requirements and requisitioning parts.

## B. NADEP NI BUSINESS PRACTICES

This section examines practices utilized by NADEP NI and other DoD agencies in the component repair processes.

### 1. Responsibilities of Other Agencies

While NADEP NI is a Designated Overhaul Point (DOP) for identified components, there are three other organizations that play a critical role in the process. FISC SD is considered the Designated Support Point (DSP) to NADEP NI. The DSP's responsibilities include monitoring and expediting requisitions, transferring custody and updating the condition code of components, and maintaining custody of G condition components while awaiting parts or induction into the repair process.

As indicated in Chapter I, NAVICP-Phil owns the aviation components that NADEP NI repairs. As the owner of the material, NAVICP-Phil is responsible for forecasting induction requirements and providing that information to NADEP NI for scheduling and resource planning. NAVICP-Phil is the inventory manager for all Navy aviation components.

DLA owns and manages the wholesale stock that NADEP NI uses to repair components. DLA maintains warehousing and distribution centers throughout the continental United States. Material that is required to complete the repair of a component is requisitioned from DLA who is responsible for managing those items and filling customer orders.

### 2. Levels of Maintenance

The Navy utilizes three levels of maintenance for aviation component management: Organizational (O-level), Intermediate (I-level), and Depot (D-level).

Squadron maintenance personnel perform O-level maintenance at the squadron level. These actions generally include preventive maintenance, minor repairs, and removing and replacing components that are degraded or inoperational. The primary focus of O-level maintenance is to keep the aircraft flying on a day to day basis in order to meet operational commitments.

Aviation Intermediate Maintenance Departments (AIMDs), which are located on aircraft carriers and amphibious helicopter ships, perform I-level maintenance for deployed squadrons. AIMDs are also located ashore at Naval Air Stations (NASs). AIMDs can perform repair on degraded components, which are then either returned to the squadron to complete repairs on an aircraft or put back in the stock of the local supply department. AIMDs perform repairs that are beyond the capability of the O-level in order to keep aircraft operational availability high.

D-level maintenance is performed on NRFI components at DOPs. D-level facilities have more advanced capabilities than AIMDs and perform repairs, overhauls, and calibrations on components that have been inducted into the repair process.

Maintenance codes identify the authorized level of repair for a specific component and are found on the Allowance Parts List for that component. If a component is not authorized for repair at the O or I level, then it is considered a Depot Level Repairable (DLR) and must be repaired at the D-level. When a NRFI component is removed from an aircraft and identified as a DLR, it must be routed to the DOP for repair.

### 3. Component Induction Forecasting

NAVICP-Phil uses condition codes to identify a component's readiness for issue and current maintenance status. Condition codes that are most relevant to this research are as follows:

1. A Condition - indicates a component is ready for issue (RFI) and in serviceable condition.
2. F Condition - indicates a component is not ready for issue (NRFI) and requires repair.

3. M Condition - indicates a component is undergoing repair or reconditioning.

4. G Condition - indicates a component is not in the repair process but awaiting parts or awaiting induction following the receipt of all required parts.

When a DLR fails in the fleet, its condition code changes to F condition and it is routed to the appropriate DOP. Usually, the component is placed in storage at the DSP until such time that the component is identified for induction. When demand warrants returning the F condition unit to A condition, the component is then inducted into the repair process at the DOP.

NAVICP-Phil maintains inventory visibility of all components, regardless of condition code, and uses this information to determine demand on families of components and to forecast induction requirements. NAVICP-Phil must manage the pipeline of NRFI and RFI components to ensure fleet requirements are met and also provide accurate forecasts to the DOPs for advance workload and resource planning. Failure to provide accurate forecasts results in inefficient utilization of resources, increased component RTAT, greater pipeline inventory investment requirements, increased component repair costs, and decreased fleet readiness.

Induction planning starts with a Component Repair Conference (CRC) attended by NAVICP-Phil, NADEP NI, and Naval Aviation Depot Operations Center (NADOC) and allows negotiations for induction requirements. This conference is held semiannually with a goal of forecasting induction requirements in order to meet fleet requirements for high demand critical components, leveling workload requirements for the DOP, and allowing more efficient use of resources by the DOP. NAVICP-Phil Inventory Managers estimate quarterly production requirements by factoring in current inventories of NRFI and RFI components, production lead-time, and fleet demand for that particular component. These preliminary requirements are provided to NADEP NI prior to the CRC. NADEP NI planners and estimators examine the proposed workload requirements with the respective repair shops to determine if NADEP NI has the capacity and resources available to meet NAVICP-Phil's repair requirements. Actual component inductions are then negotiated at the CRC with a goal of balancing repair requirements, DOP plant capacity, resource availability and utilization, and NRFI carcass availability. The CRC's goal is to produce a firm induction schedule for the next two quarters.

There is a second scheduling process called B08 scheduling and it is calculated on a weekly basis. This process is intended to rectify unexpected inventory shortages that emerge from higher-than-expected demand, fill DOP excess capacity, resolve NRFI carcass availability problems, and accommodate rework requirements. This system solves short term scheduling problems by filling DOP capacity deficiencies, shifting workload requirements to offset NRFI carcass shortages, and to meet unanticipated demand. It also allows component surveys to be factored into the scheduling equation.

It should be noted that historically, the CRC has focused on only the next two quarters for induction forecasting. As discussed in Chapter II, MRP II requires a planning horizon greater than the longest material lead-time. For this reason, the CRC is expected to transition to an eight-quarter forecast. The ability to execute this transition so that the variability of an eight-quarter forecast is sufficiently low in order to allow accurate material planning is critical to the success of MRP II at NADEP NI.

B08 scheduling is conducted unilaterally by the DOP with NAVICP-Phil's permission in order to allow induction requirements to be modified from CRC decisions based on the availability of more recent and accurate information. The DOP has the latitude to induct components if it has available capacity, the need for that component exists, and there are available NRFI carcasses available.

### 4. Material Planning

As discussed in Chapter II, material planning in the component repair process is critical to successful implementation of MRP II. In order to accomplish this, it is necessary to evolve the material planning philosophy from that of evaluating demand history of repair parts to estimating part requirements based on forecasted inductions. However, prior to reaching this step, it is necessary to analyze every component in order to determine the probability that a part will require replacement during the repair process. The Bill of Material (BOM) is utilized for this purpose.

A BOM lists the complete array of parts requirements for a particular component and includes such information as parts listed by Navy Item Identification Number (NIIN), part name and number, cognizant symbol (COG), unit of issue (UI), units per application (UPA), and price. A BOM is constructed from information available from numerous sources. These sources include the Master Data Record (MDR), the Illustrated Parts Breakdown (IPB), and Logistics Engineering Studies (LES) and they allow the component's parts breakdown structure to be identified and documented so that all parts and subassemblies are identified on the BOM. NADEP NI uses North Island BOM (NIBOM) as their local software program for constructing BOMs and managing the database. A sample BOM taken from NADEP NI is provided in Appendix A.

As indicated in Chapter II, the component repair process involves rebuilding and repairing DLRs vice manufacturing a unit from scratch. A manufacturing BOM would need no additional information than that identified above. However, when a component is repaired or overhauled, only those parts that are considered broken or degraded are replaced. For this reason, additional information must be included on the BOM for utilization by the DOP in the repair process. Every part listed on the BOM has a calculated replacement factor (RF) that represents the probability that the part will need to be replaced during the repair process. This factor is determined from historical repair records for that component and from demand history for the individual parts. The RF is critical for accurate material planning and represents a potential source of variability.

RFs are calculated in NIBOM and are determined from historical data on the component. The data in NIBOM is obtained from the NAVAIR Industrial Material Management System (NIMMS). The resulting RF is included on the BOM for each individual part. NIBOM history is built from records of material that is received by the DOP or completed requisitions. If there are long lead-times for a specific part, NIBOM's historical records would not reflect those items that are still outstanding, and therefore data would be skewed and could mask serious material problems. For this reason, a manual RF supercedes a calculated RF in order to counter any serious material availability problems that are not captured by NIMMS. Usually, the artisan is responsible for providing this information to the BOM manager.

Since the BOM is the primary tool for estimating material requirements to support a quarterly workload schedule, BOM accuracy is critical to ensuring adequate material availability to support the repair process. BOM accuracy is measured in terms of range and depth. BOM range determines the accuracy of the BOM in terms of whether a part required for component repair is listed on the BOM. This is a function of the completeness of the initial BOM construction and the effectiveness of a quarterly review of parts that are candidates to be added to the BOM.

A second BOM accuracy measurement is BOM depth. Depth is a measurement of the RF accuracy. The RF is updated on a quarterly basis and the delta between the current quarterly

RF and the historical RF is tracked. RF variability of less than ten percent is considered the benchmark for NADEP NI performance standards. If the RF varies by more than ten percent, investigation is required to determine if there might be an error in recorded information on the BOM that would cause large variation in the calculated RF. A common cause of RF variability is an error in the UPA that causes more or fewer parts to be replaced than indicated by the RF.

Total BOM accuracy is a product of BOM Range Accuracy and BOM Depth Accuracy. A BOM with a range accuracy of 0.9 and a depth accuracy of 0.9 would have an overall BOM accuracy of 0.81.

#### 5. Component Processing Practices

Based on the CRC quarterly component induction schedule, NADEP NI develops a weekly induction schedule that accounts for production requirements, plant capacity, resource availability, and available NRFI or F condition carcasses. Components are inducted from the pool of F condition DLRs that are stored at the DSP. The fleet supplies the F condition pool when failed components are routed to the DSP to await induction into the repair process.

When inducted, the component is routed to an artisan who inspects the component and determines if the component can be repaired. If it is beyond repair, it is surveyed. If it can be repaired, the artisan determines the parts necessary to complete the repair. The artisan can acquire parts from NADEP NI's Focus Stores, which provides a readily available inventory of common parts. If the required parts are not available, then the remaining required parts are requisitioned based upon information on the BOM. The component is placed in a delay status and routed to Production Control for stowage until the required parts are received. When the parts are received, they are matched to the appropriate component and routed back to the artisan for repair. If the parts have an estimated shipping date (ESD) more than 45 days in the future, then Production Control takes action to transfer the component to G condition.

When a component is placed in G condition, the RTAT is interrupted and the time spent in G condition does not count against NADEP NI performance measures. The component is placed in G condition stowage in FISC SD's G-Stores until the required parts are received.

While in G condition, a component is classified as Awaiting Parts (AWP) as long as there are outstanding parts requisitions for that component. Once all parts are received and matched to the appropriate component, the component is not automatically routed back to the NADEP NI repair shop. Instead, it is classified as Awaiting Induction (AWI) and will remain in G-Stores until NADEP NI requests for re-induction. This allows the cognizant shop to manage their workload and not induct components before resources are available to complete the repair. It also ensures NADEP NI's RTAT clock does not resume until the shop is ready to complete repairs.

When a part is inducted and the appropriate shop completes repairs, the unit's condition code is updated to A condition and it is routed to the DSP where it will ultimately be routed to a stock point designated by NAVICP-Phil. The unit is now available for issue to the fleet.

## C. UAMOC BUSINESS PRACTICES

This section examines the component repair practices employed by United Airlines Maintenance Operations Center at San Francisco International Airport.

### 1. Organizational Responsibilities

United Airlines utilizes two levels of maintenance: organizational and depot level. UA operates maintenance facilities that include domestic line maintenance activities in Denver, Chicago, Los Angeles, and New York. UA also operates depot level activities in Indianapolis and San Francisco. San Francisco is the primary overhaul point for repairable components. UAMOC is responsible for managing approximately 20,000 line items, which UA calls "recoverables". Roughly 80 percent of the recoverables that are repaired at UAMOC are used for inventory replenishment while the other 20 percent are used directly in aircraft overhaul processes.

A recoverable is assigned a Home Shop, which has overall responsibility for repair and overhaul of that line item. The Home Shop can either repair the unit in-house or outsource the repair to an outside vendor or to the original equipment manufacturer.

The Home Shop is also responsible for setting inventory levels for all cognizant recoverables by determining a Maximum Spares Allocation (MSA). By setting the MSA for the total system inventory levels, the Home Shop is capable of planning repair resource requirements based on the estimated number of recoverable repairs required to meet the MSA.

UAMOC inventory managers are co-located with and report to the same manager as the component shop personnel. Both work toward the common goals of meeting established system inventory levels, reducing overall TAT, and attaining organizational cost objectives. TAT as tracked by UAMOC is the total time it takes to return a recoverable to RFI condition.

The close working relationship between inventory managers and repair personnel allows rapid response to changes in system requirements by adjusting inventory levels in response to increased demand. The ultimate goal is to reduce TAT. This arrangement facilitates that end.

### 2. Component Repair Scheduling

Since both the Inventory Managers and repair shop personnel work in the same organization and work toward the same goals, there is no need to negotiate the quantity of components to be repaired in a given period. The goal is to meet the required MSA and to reduce TAT in order to ensure recoverables are available to meet depot and line needs.

When a recoverable fails on an aircraft, the line activity removes and replaces that component and routes the NRFI unit back to the Home Shop in accordance with UA guidance. At this time, the line activity also enters the information into UA's System Inventory Priority (SIP) database. The SIP produces a report that allows the Home Shop to manage recoverable repairs and workload. The SIP identifies all recoverables in the repair pipeline by part name and number, quantity needed for repair that day, MSA, total units available in RFI condition, flight criticality code, and a value-added factor. This factor weights asset availability, airframe application, and the revenue generation for the route of that type of aircraft. This is the primary means of prioritizing repairs for recoverable components. The greater the impact a component has on revenue generation, the higher the priority it receives on the SIP. Since RFI/NRFI inventory levels are updated daily in the SIP database, the value-added factor for a recoverable in the repair pipeline is in constant flux. The priority will continue to shift until the recoverable is inducted into the repair process. At this time, the priority is locked. From this point on, all recoverables in the repair shop are handled on a First-In, First-Out (FIFO) basis.

If the recoverable urgency of need changes from the priority given on the SIP after it is inducted, expediting is accomplished through personal intervention by repair shop personnel, supervisors, and managers. This becomes necessary when an aircraft is grounded or an overhaul process is being held up due to parts shortages.

Parts required to complete component repair are drawn from UA's stores inventory and available parts are turned over to repair shop personnel. If parts are not readily available, then stores personnel take action by locating the part from another UA shop, another airline, or by initiating a procurement from a vendor or manufacturer. The component is then placed in a delay status called "Held Out of Service" until all parts necessary for the repair are received. Lead-time for parts is rarely more than two weeks. In the meantime, the repair technician goes to the next component on the priority list using FIFO.

All NRFI recoverables are stored in the Home Shop and have visibility on the SIP report and all recoverables will enter the repair process eventually. The priority given on the SIP determines a components relative position in the queue and when it will be inducted into the repair process.

### 3. Incentives and Performance Measures

UA is an employee-owned company. Employees own 51 percent of the airline and are offered an employee stock option plan. There is frequent and widespread education throughout the organization to ingrain the relationship between TAT and pipeline inventory and the ramifications of these on costs. An indication of the relative importance that UAMOC places on this relationship is the fact that computer screen-savers espousing this relationship are found throughout the UAMOC facilities. Inventory reduction is considered necessary to reduce costs and to ensure UA remains competitive within the airline industry. And this is critical for employee job security and for maintaining an individual's standard of living. For this reason, inventory and TAT reduction are primary goals for the organization and all employees within UAMOC.

## D. COMPARE AND CONTRAST OF THE PROCESSES

Figures 3-1 and 3-2 are diagrams of the organizational structures employed at UAMOC and at NADEP NI.

Figure 3-1 shows the component repair process flow at UAMOC. It is a highly compact process with multiple responsibilities centralized within a single organization. Of particular interest is the fact that inventory management, component repair, and material procurement are in the same organization. This arrangement is congruent with the goal of reducing TAT. All three functions are managed centrally and judged by their contribution to reducing TAT and component inventory.

Figure 3-2 shows the component repair process of which NADEP NI is a part. It details a complex arrangement of organizations, each with multiple customers and suppliers in the value chain. Unlike UAMOC, all of the key functions in the Navy process are assigned to separate organizations, each receiving their funding from, and reporting to, a different superior. These organizations (NADEP NI, DLA, and NAVICP-Phil) have widely differing measures of success, which reward different behaviors. It highlights the fact that NADEP NI is highly dependent on external activities for

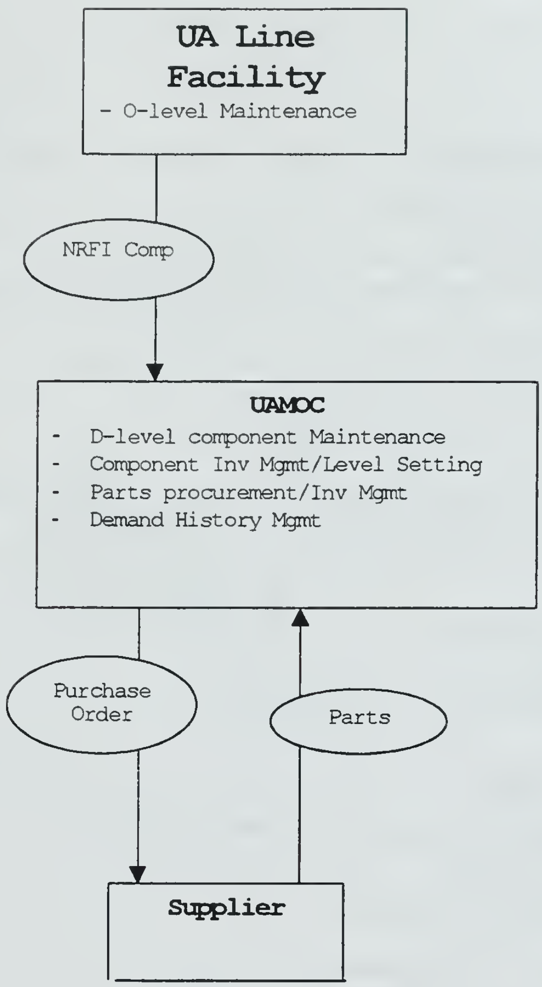


Figure 3-1. UAMOC Component Repair Process Flow

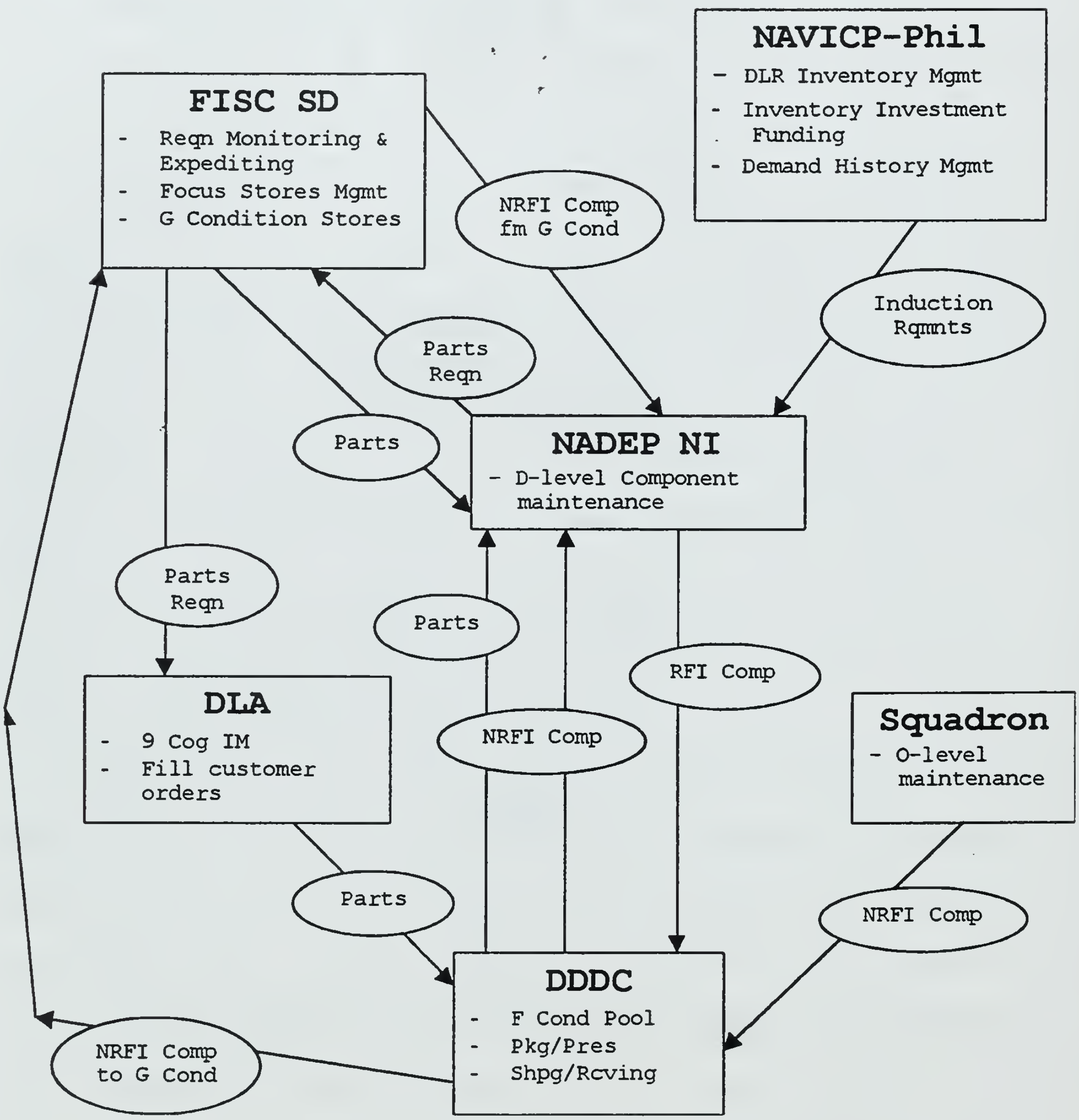


Figure 3-2. NADEP NI Component Repair Process Flow

the success of the component repair process. If these organizations are not rewarded for the same outcomes or judged by the same performance measures, then NADEP NI's energy is spent trying to overcome these barriers.

A major difference between the two processes is the relative importance each places on TAT and inventory reduction. As discussed previously, UAMOC places great emphasis on TAT for the organization and educates all employees on its importance and its impact on operations. In addition, UA employees recognize the impact on them, as individuals since the organization is 51 percent employee-owned. There is little evidence of recognition of the relationship between TAT and component pipeline inventory levels at NADEP NI.

While UAMOC tracks total TAT closely, NADEP tracks RTAT. TAT considers the total time that a component is not available for issue, while RTAT only considers the time the component is in the repair process. The time spent in G condition does not count against NADEP NI's RTAT. There is little incentive to get an item out of G condition as long as there are other NRFI components to repair. There is little emphasis placed on expediting the parts required to repair the components. Consequently, components languish in G condition for excessive periods of time waiting for the supply system to provide the required parts. The longer TAT requires higher component pipeline inventory levels in order to satisfy fleet demand.

In Figure 3-1, UAMOC's inventory managers and component repair personnel are part of the same organization and report to a common manager. This arrangement is in stark contrast to the system employed by the Navy where NADEP NI provides the repair services for components that are owned and managed by NAVICP-Phil. In addition, another organization (DLA) provides the parts needed to repair the components. Individuals within these organizations are not impacted by TAT issues and have little incentive to reduce TAT and pipeline inventory.

Another difference between the two organizations is the way components are selected for repair. At UA, every failed component is placed on the SIP and enters the repair pipeline. The assigned repair priority determines when a particular component is actually inducted for repair, but every component on the SIP will be repaired. This contrasts sharply with the Navy practice where a NRFI component is routed to the DSP where it sits in F condition inventory pending a negotiated agreement between NAVICP-Phil and NADEP NI to induct the unit for repair. Units may stay in this status for a prolonged period due to resource and capacity constraints, insufficient demand, or oversupply of NRFI units.

Because of the differences in missions, it is not feasible to consolidate the Navy organizational structures shown in Figure 3-2 in order to make them look more like the UAMOC structure shown in Figure 3-1. However, it is possible to make the two processes behave more alike by changing the reward structure among the various military organizations that contribute to the process. By measuring each activity's contribution to TAT and component inventory reduction, the behaviors needed to reach those goals would be reinforced, including fostering a closer working relationship and more communication between the repair organization, inventory managers, and piece-part managers. This modification would require enormous commitment on behalf of these organizations and their reporting seniors. It would involve significant risk sharing which places trust and reliance on external organizations in the pursuit of performance goals. However, organizational behavior cannot be changed without a modification to the rewards and incentives for the organization and the individuals within the organization.

# IV. SELECTION OF REPRESENTATIVE COMPONENTS

## A. INTRODUCTION

This chapter outlines the components utilized in this research and identifies the selection criteria for those components. There are approximately 3,500 total components that comprise NADEP NI's active workload, however they do not all equally contribute to revenue generation relative to total component workload.

## B. COMPONENT CATEGORIES

Components are categorized into Family Identification Codes (FIC). FICs represent components with similar designs and part requirements, and serve identical or slightly modified end-uses or applications. They also have similar repair requirements and workload standards for NADEP planning purposes.

Within FICs, components are further classified into Item Identification Codes (IIC). Components within the same FIC but with different IICs usually represent slightly different designs, either through modifications to the existing engineering drawings or through original engineering designs that may vary slightly but serve the same application. Each IIC is generally assigned its own

NIIN and receives individual inventory management attention from NAVICP-Phil. However, different IICs within the same FIC generally have the same unit price and the same workload standard for NADEP NI resource planning purposes.

### C. COMPONENT WORKLOAD ANALYSIS

NADEP NI tracks the revenue generation of the active component workload. Of the 3,500 component IICs in NADEP NI's active workload, 458 IICs account for 80 percent of the revenue generated from NAVICP-Phil scheduling component workload at NADEP NI. In Fiscal Year (FY) 1997, NADEP NI's component workload was valued at 175 million dollars. Based on this, the top 80 percent of revenue generators account for 140 million dollars in workload.

Since this grouping accounts for the largest percentage of revenue generated in NADEP NI's component repair processes, these components are targeted for research analysis.

The 458 IICs are grouped into 260 FICs. Since the majority of component data at NADEP NI are tracked by FIC and not by IIC, component research selection is based on FIC. The complete listing of the 260 top revenue generating FICs are found in Appendix B.

A ten-percent sample of the 260 FICs is selected and identified in Figure 4-1. The components selected vary in characteristics with respect to responsible repair shop, quarterly RFI completions, aircraft applicability, workload labor standards, unit prices, and quantities in G condition.

| FIC | COG/NSN | PART NAME | UNIT PRICE ($) |
|---|---|---|---|
| 280A | 7R 5841-00-119-4525 | Receiver | 211,660 |
| 5QQA | 7R 1620-00-617-9551 | Strut | 101,170 |
| A4XA | 7R 1680-01-154-7535 | Trim Actuator | 35,690 |
| A607 | 7R 5815-00-116-7532 | Keyboard | 44,040 |
| AEG6 | 7R 4810-00-021-6755 | Valve, Elec-Hyd | 4,460 |
| ARWA | 7R 6615-00-757-5816 | Gyroscope | 4,120 |
| B1FA | 7R 5985-00-895-1002 | Ant-Trg | 77,430 |
| BAR7 | 7R 2925-00-134-0130 | Starter-generator | 7,670 |
| BS5A | 7R 1270-01-334-8678 | Computer | 64,030 |
| C6PA | 7R 6130-01-348-1008 | Power | 2,010 |
| C800 | 7R 6620-00-755-7169 | Flow Transfer | 3,350 |
| E1RA | 7R 1650-00-442-8061 | Hydraulic Motor | 71,640 |
| FQAA | 7R 1560-01-125-8000 | Aileron | 47,700 |
| FRSA | 7R 1680-00-631-9680 | Drive, con | 79,420 |
| G4VA | 7R 1650-00-688-8478 | Actuator, electro | 104,400 |
| GRUA | 7R 1560-01-148-9829 | Stabilizer, Horiz | 62,080 |
| HBPA | 7R 6115-01-119-0648 | Generator | 44,100 |
| JAJ9 | 7R 1560-00-245-3022 | MLG Door | 64,030 |
| KF86 | 7R 6605-00-294-8890 | Indicator, Attitude | 28,810 |
| MHBA | 7R 1620-00-969-9467 | Steer-Dmp | 16,870 |
| P1Y0 | 7R 1650-01-125-7196 | Slv Xdcr | 4,050 |
| PK86 | 7R 1650-01-113-6033 | Damper-cyl | 15,710 |
| PWC4 | 7R 4320-01-131-1435 | Pump axial | 27,100 |
| PXBA | 7R 1560-00-942-8197 | HK-E2-Shnk | 7,280 |
| Q2H4 | 7R 1650-01-177-1963 | Servo Valve | 33,710 |
| Q4V7 | 7R 1620-01-191-5694 | Strut | 391,470 |

Figure 4-1. Components Selected For Analysis

The sample is reviewed for adequacy of representation of the population of components repaired at NADEP NI. The avionics, instruments, hydraulics, and electric repair shops are represented in the sample. Quarterly RFI credits range from zero for FIC Q4V7 to 61 for FIC PWC4. Aircraft applicability includes S-3s, E-2s, F-14s, and F/A-18s. The workload standard, which determines the rate at which NADEP NI generates revenue, ranges from five hours for FIC P1Y0 to 232 hours for FIC GRUU. Component unit prices range from about 2,000 dollars for FIC C6PA to nearly 400,000 dollars for FIC Q4V7. The components also vary in the degree of material problems encountered as indicated by the G condition inventory levels. These range from 80 for FIC P1Y0 to zero for multiple FICs. Based on a cursory review, the sample is considered representative of the population of components that NADEP NI is responsible for repair.

# V. DATA ANALYSIS

## A. OVERVIEW

This chapter analyzes data collected at NADEP NI with respect to variability in the material planning aspect of the component repair process. As discussed in Chapter IV, 26 components are selected for analysis. Forecast accuracy, BOM accuracy, and material lead-time data are analyzed separately in order to make inferences about NADEP NI's ability to reap the benefits of implementing MRP II.

## B. COMPONENT INDUCTION FORECAST ANALYSIS

As discussed in Chapter III, NADEP NI component induction forecasts are developed for two quarters in a three-tiered process. The process starts with NAVICP-Phil providing preliminary requirements and then revised forecasts to NADEP NI. Forecasts are finalized at the CRC where NADEP NI and NAVICP-Phil negotiate the final induction levels for the next two quarters. Appendix C contains the NADEP NI Quarterly Component Production Reports for first quarter FY 1998 (julian dates 7271 through 7361) and second quarter FY 1998 (julian dates 7362 through 8087). These reports show the forecasted values for component inductions by FIC. The preliminary forecasts represent the initial forecasted requirements provided by NAVICP-Phil. The "ICP Req" column represents NAVICP-Phil's revised forecast and the "Prod Req" column indicates the final negotiated induction quantities agreed to by NAVICP-Phil and NADEP NI. The column titled "RFI" documents the number of components that were returned to A condition and is the basis for measuring NADEP NI's production. NADEP NI receives revenue only for completed components.

Appendix D contains data analysis tables for quarters one and two as taken from the Quarterly Component Production Reports. Three different relationships are analyzed in the Appendix D tables: NAVICP-Phil Preliminary Forecast versus actual number of components returned to RFI condition; NAVICP-Phil Revised Forecast versus actual number of components returned to RFI condition; and CRC Negotiated Workload versus actual number of components returned to RFI condition. Each are analyzed to reflect the percent variation from the forecast. The first quarter preliminary forecast variation percentage relative to RFIs completed for FIC 280A is shown below as an example.

$$\text{Pct Variation} = \frac{\text{ICP Prelim} - \text{RFI Comp}}{\text{ICP Prelim}} \times 100$$

$$\text{Pct Variation} = \frac{15 - 12}{15} \times 100 = 20\%$$

The percent variation is calculated using the absolute difference between the forecast and actual components completed in order to demonstrate total variability instead of net variability between high and low forecasts.

A review of the analysis indicates that the mean variation is skewed to reflect a value higher than is representative of the population of components. This is due to several components having excessively high forecast variation percentages. For this reason, the median is utilized for further analysis. Figure 5-1 summarizes the component forecast accuracy relative to actual RFI components completed for each quarter.

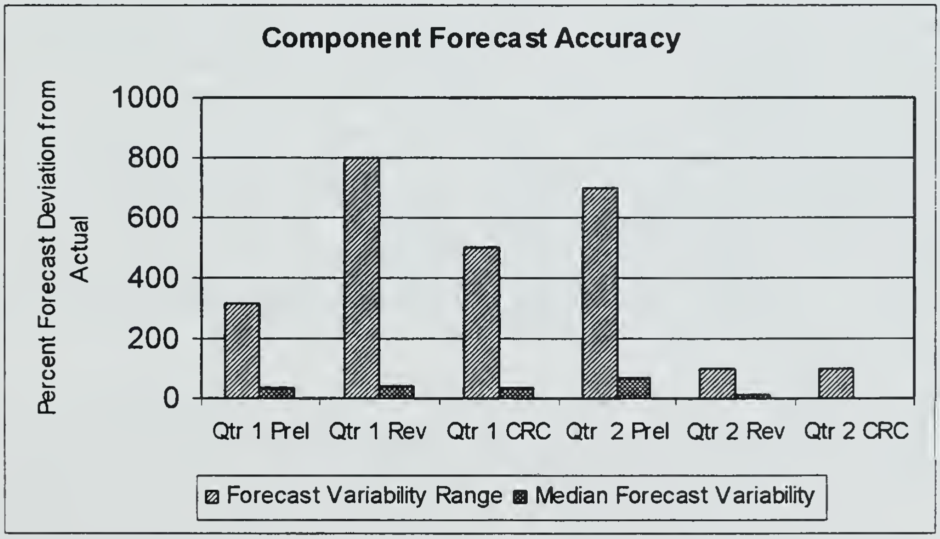


Figure 5-1. Component Forecast Accuracy

The range forecast variability bar indicates the range of forecast error relative to actual production for all sample FICs during the execution quarter. The median forecast variation bar indicates the median forecast error relative to actual production for all sample FICs during the execution quarter. In all cases, there is significant error in the forecast relative to actual RFI components completed. The median component variation ranges from 38 to 43 percent in quarter one. However, the variation ranges are 313, 800, and 500 percent for the preliminary, revised, and final negotiated estimates respectively. These numbers show tremendous error in each of the forecasts relative to the actual number of components completed.

Quarter two median variations are 74, 12, and zero percent for preliminary, revised, and CRC negotiated estimates respectively. But again, when considering the variation ranges of 700, 100, and 100 percent, there is still high variation in the forecasted component repairs versus actual repairs. This degree of forecast error will not allow accurate material planning and therefore will not support MRP II.

Forecasting component demand for military applications is a highly complicated process, which is subject to numerous external influences. The accuracy of the component's stated reliability is the basis for initial spares allocation and the established maintenance concept. If actual reliability varies from the stated reliability, forecasted demand will be in error. In addition, the rate at which a component fails is highly dependent upon the environment in which the aircraft operates, mission profiles, and the operational tempo employed. Since these factors vary significantly from one deployment to another, the forces driving component failures and demand vary widely. These factors greatly complicate the ability of NAVICP-Phil to provide accurate component demand forecasts. Other factors impact demand, including DoD budgetary concerns and unanticipated contingency operations. These are factors that private sector organizations such as United Airlines do not have to contend with.

## C. BOM DEPTH ACCURACY ANALYSIS

As discussed in Chapter III, Total BOM Accuracy is a product of BOM Range Accuracy and BOM Depth Accuracy. BOM Range Accuracy is not closely tracked at NADEP NI. NADEP NI estimates that BOM Range Accuracy is between 81 and 86 percent. However, since the validity of these accuracy rates could not be determined, range accuracy is assumed to be 86 percent.

Since BOM Depth Accuracy is a measure of the RF accuracy, this value is crucial to material planning in a repair environment. Appendix E contains Depth Accuracy values as tracked at NADEP NI for each of the 26 components. Accuracy rates are updated every quarter. The component inductions represent the total inductions since NIBOM data collection began. These values are weighted for component inductions for that FIC. The weighted BOM accuracy for FIC 280A is derived as follows.

$$\text{Weighted BOM Accuracy} = \frac{\text{FIC Comp Inductions}}{\text{Total Comp Inductions}} \times \text{FIC BOM Accuracy}$$

$$\text{Weighted BOM Accuracy} = \frac{42}{3311} \times 0.7924 = 0.0101$$

The accuracy measurements in Appendix E are weighted based on inductions for each FIC as a percentage of total components inducted for that quarter. Therefore, the sum of the individual BOM Depth Accuracy measurements provide the overall BOM Depth Accuracy at NADEP NI for the FICs selected. The BOM Depth Accuracy weighted average for the sample of components is 93.4 percent.

Figure 5-2 displays FIC BOM Depth Accuracy as a function of total FIC inductions. The data points are plotted as a scattergraph using Microsoft Excel and a trend-line is added using the Excel chart trend-line function. A logarithmic trend-line superimposed through the data points results in a coefficient of determination ($r^2$) of 0.5453 and indicates a relationship exists between BOM Depth Accuracy and component inductions.

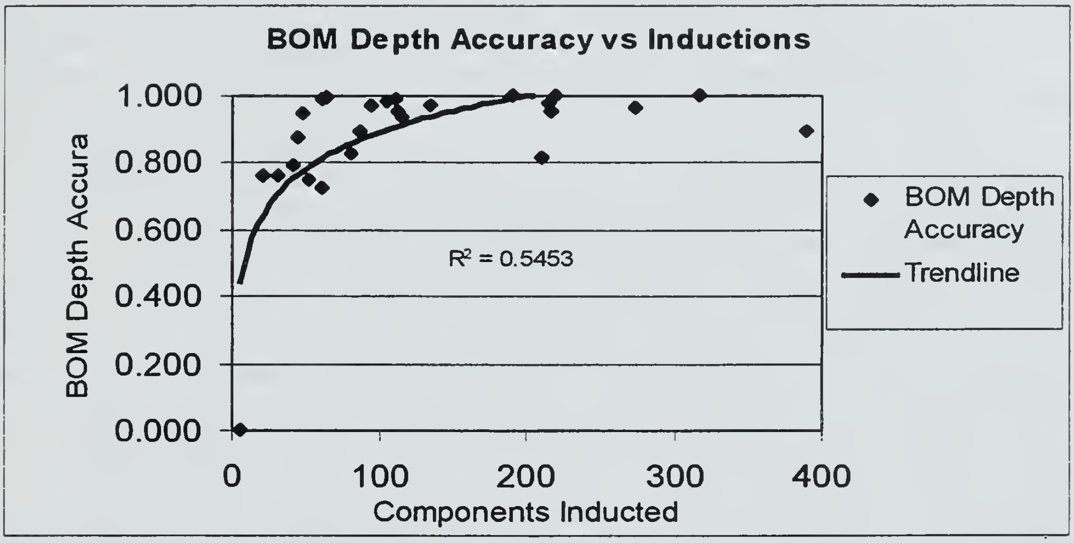


Figure 5-2. BOM Depth Accuracy Versus FIC Inductions

The trend-line indicates that depth accuracy improves as FIC component inductions increase. The author hypothesizes that this can be explained in part because as more components are inducted, part replacement data accumulates which tends to increase the accuracy of the RF. This would indicate that the variability associated with the

RF would decrease with time as component induction data accumulates.

Component configuration changes or engineering modifications would be expected to cause BOM accuracy to drop. However, accuracy measurements would be expected to follow the same trend described above until BOM accuracy reaches acceptable levels.

BOM accuracy is the basis for determining material requirements in the repair process. NAVAIR's corporate goal for Total BOM Accuracy is 95 percent. This accuracy level requires BOM Range Accuracy and BOM Depth Accuracy levels of 97.5 percent each. As discussed in this section, current BOM accuracy measurements are significantly below this level. With Depth Accuracy of 93 percent and estimated range accuracy of 86 percent, overall BOM accuracy is estimated to be 80 percent. This indicates that material estimates will have an 80 percent accuracy rate, which is unacceptable in MRP II. Figure 5-2 shows that this accuracy measurement is expected to improve as usage data accumulates. However, it cannot be determined from this data whether the accuracy rates will reach NAVAIR's stated goal of 95 percent.

Continued tracking and analysis of material usage data and the improvement of BOM accuracy rates must remain a priority at NADEP NI. Otherwise, material planning for repair processes will be haphazard at best with significant error expected in the estimates.

### D. REQUISITION LEAD-TIME ANALYSIS

Reliable OST for material requirements is critical to managing resource planning in MRP II. MRP II requires a planning horizon greater than the longest material lead-time. At NADEP NI, G condition components have the longest material lead-times and thus present a good opportunity to study lead-time issues.

Currently, material required for component repairs are requisitioned five weeks prior to the beginning of the execution quarter. When NADEP NI does not expect parts to be shipped for at least 45 days, components are transferred to G condition. As of 21 April 1998, there were 3,660 components in G condition representing 654 FICs. Of these components, 2,904 were in AWP status with outstanding requisitions for parts. Requisitions for parts against G condition assets are analyzed to gain an understanding of how requisition lead-time impacts the material-planning horizon at NADEP NI.

Appendix F contains an excerpt from a bi-weekly G Condition Status Report dated 15 May 1998. This report details every G condition asset and all outstanding requisitions against that component. It is the source of requisition data for this research.

Appendix G summarizes the pertinent data from the G Condition Status Report for all sample FICs as of 15 May 1998, the date of the status report in Appendix F. The data used includes total number of components in G condition per FIC, all requisition julian dates for the FIC, and the age of each requisition. Many parts are ordered more than once for replacement in multiple components. The data in bold represents the oldest requisition for each different NSN on order.

Many G condition components within a FIC are awaiting the same parts. If the ages of multiple requisitions for the same part are averaged, the resulting calculation masks the true lead-time for a part. Since all parts are ordered under the same priority, newer requisitions will not be filled before the older requisitions. Therefore, it is more appropriate to look only at the oldest requisition for each part on order instead of an average of all requisitions for the same part.

Figure 5-3 shows the results of the analysis. There are 223 components from the sample FICs in G condition. 18 of the 26 sample FICs have at least one component in G condition and an average of 12 G condition components per sample FIC. There are 433 total outstanding requisitions for an average of two requisitions per component. However, there are only 70 different NIINs ordered under the 433 requisitions. The oldest requisition for each of these 70 items are analyzed. These requisitions are identified in bold in Appendix G.

| | Reqn Statistics |
|---|---|
| Sample FICs | 26 |
| FICs w/ G Cond Assets | 18 |
| Total Comp in G | 223 |
| Total Reqns | 433 |
| Reqns/Comp | 2 |
| Comp/FIC in G Cond | 12 |
| Total Parts Ordered | 70 |
| Oldest Reqn (days) | 722 |
| Newest Reqn (days) | 32 |
| Age Range (days) | 690 |
| Mean Reqn Age (days) | 253 |
| Median Reqn Age (days | 219 |

Figure 5-3. Requisition Analysis Summary

Figure 5-3 shows that the requisition age for these 70 requisitions ranges from one month to nearly two years (32 to 722 days). The sample data distribution is pictured in Figure 5-4. It clearly shows that the older requisitions skew the mean age to the right. However, when using MRP II, unusually long lead-times cannot be treated merely as anomalies, but rather, they must be part of the planning horizon. As discussed in Chapter II, an accurate forecast horizon must extend to the longest material lead-time.

NAVAIR identified 98 percent inventory accuracy as a requirement for MRP II implementation. However, the author

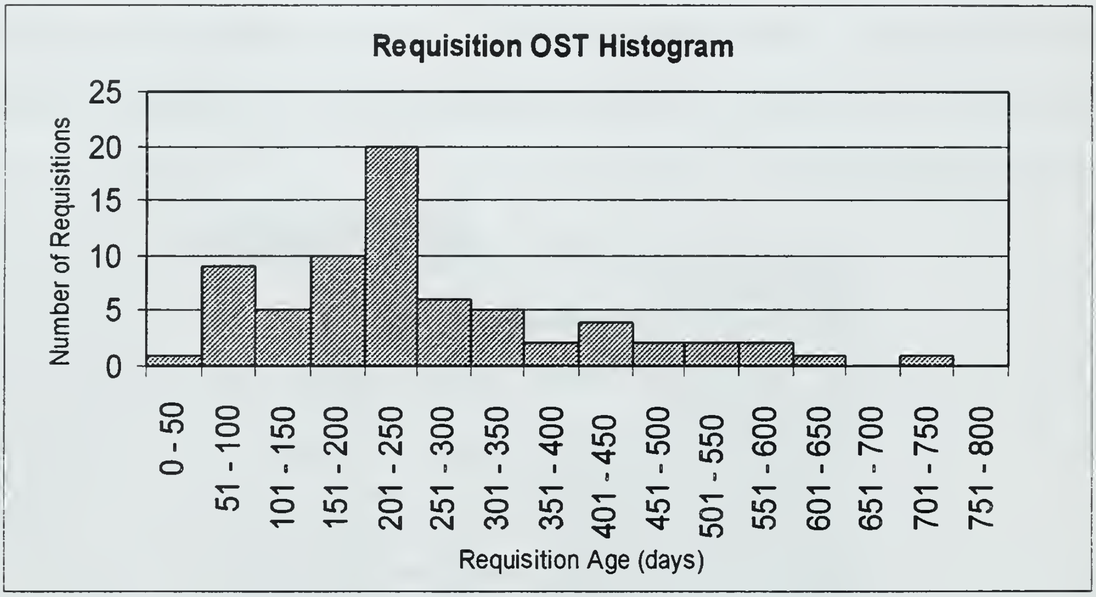


Figure 5-4. Requisition OST Histogram

believes this is a misnomer since a 98 percent inventory accuracy rate at NADEP NI will only ensure material availability if the material is carried at NADEP NI and in stock at the time it is needed. Inventory accuracy of 98 percent does not equate to material availability 98 percent of the time. Since many parts are not stocked locally, the author believes that a 98 percent material availability rate is more appropriate and is thus used as a benchmark to determine the effective material-planning horizon. This is more realistic as it considers delay time associated with requisitioning the required material.

To ensure 98 percent of the required material is available when needed, 98 percent of the 70 requisitions must be received when needed. 98 percent of the 70 requisitions rounds to 69, meaning that the planning horizon must extend to the 69th requisition to ensure 98 percent material availability. The 69th requisition is 616 days old. This represents a 20-month lead-time that must be factored into material planning in MRP II. This explains the perceived need to transition to an eight-quarter forecast. However, this approach may not be feasible.

It is highly unlikely that, given the dynamic military operating environment, an accurate forecast can be developed two years prior to the execution quarter. Therefore, it is appropriate to examine how the planning horizon can be reduced. In order to reduce the planning horizon, material lead-times must be reduced. Figure 5-4 shows that 14 of the 70 oldest requisitions recorded for the sample FICs are between one and two years old. These account for 20 percent of the G condition requisitions. Table 5-5 provides the value of the components that have been in G condition for at least one year.

These ten FICs account for 34 components that have been in G condition for at least one year. When considering all components from the 26 sample FICs in G condition, these 34 represent 15 percent of the total G condition population (223). Therefore, by solving material availability problems on 15 percent of the G condition components, the forecast horizon is reduced from two years to one year, or by 50 percent. In addition, this action will reduce work-in-process inventory by 2.3 million dollars for the 26 sample FICs and greatly reduce component TAT.

| FIC | Qty in G Condition | Unit Price ($) | Total Value in G Cond ($) |
|---|---|---|---|
| 5QQA | 5 | 101,170 | 505,850 |
| AEG6 | 1 | 4,460 | 4,460 |
| E1RA | 9 | 71,640 | 644,760 |
| FQAA | 1 | 47,700 | 47,700 |
| HBPA | 1 | 44,100 | 44,100 |
| KF86 | 2 | 28,810 | 57,620 |
| P1Y0 | 2 | 4,050 | 8,100 |
| PK86 | 10 | 15,710 | 157,100 |
| Q2H4 | 1 | 33,710 | 33,710 |
| Q4V7 | 2 | 391,470 | 782,940 |
| Total | 34 | | 2,286,340 |

Figure 5-5. Value of Components in G Condition One Year or More

## E. SUMMARY

The analysis presented in this chapter clearly shows that there is significant variability in the material planning process. The variability is found in forecast accuracy, material estimating as measured by BOM accuracy, and in material lead-time. Current variability in the these areas make accurate material planning a very difficult process in the military environment. In the author's opinion, due to the dynamic operating environment of the military, there is a degree of inherent variability in material and resource planning that cannot be eliminated. Therefore, the Navy will not be able to achieve Class A implementation status as discussed in Chapter II. At best, the repair process will be able to achieve Class C and possibly some degree of Class B implementation.

As the Navy already has significant time and resources committed to MRP II implementation, the issue is how to reduce the variability in order to maximize the Navy's potential benefit from MRP II implementation. This issue is addressed in the recommendations in Chapter VI.

# VI. CONCLUSIONS AND RECOMMENDATIONS

## A. SUMMARY

The data and information presented in this research regarding the suitability of the component repair process to the implementation of MRP II is sufficient for use in drawing conclusions and generating recommendations for management actions. This final chapter ends with recommendations for future study.

As discussed in Chapter V, it is the author's intention to provide constructive recommendations that will improve the material planning process and strengthen the benefits to be derived from MRP II implementation.

## B. CONCLUSIONS

**1. Within the Navy's aviation repair structure, there are critical differences in performance incentives and reward structures for inventory management, component repair, and parts procurement activities that could preclude the realization of intended benefits from MRP II implementation.**

Ineffective material planning causes longer component turnaround times (TAT) and increased work-in-process inventories. NADEP NI, NAVICP-Phil, DLA, and FISC SD each play critical roles in material planning for component repair. However, reward structures for these activities do not focus on reducing component TAT. NADEP NI could achieve a short repair turnaround time (RTAT) despite a delay caused by components waiting on parts for prolonged periods. This occurs because the delay does not count against their performance standards. Also, DLA does not measure the impact of requisition lead-time on customer production. Each organization must link TAT to component inventory levels and measure the impact of their contribution toward that end. Unless this relationship is emphasized and all activities reward the appropriate behavior, NADEP NI's production planning will remain reactive to short-term fluctuations in component demand.

**2. The lack of a reliable component induction forecast is a major barrier to accurate material planning in a military aviation component repair environment.**

The dynamic military operating environment makes predicting future demand inherently difficult. Therefore, forecast reliability increases with a shorter forecast horizon. Since MRP II requires a forecast horizon greater than the longest material lead-time, reducing material lead-time is paramount to reducing the forecast horizon. In addition, parts procurement must be initiated when the forecast is known and with sufficient lead-time to allow delivery in time to meet schedule production.

**3. The use of Replacement Factors (RFs) in a repair process adds variability to material planning that is not encountered in traditional manufacturing processes.**

The use of RFs introduces a fundamental difference in the intended application of MRP II. In a traditional manufacturing process, the parts needed to produce one unit are known with 100 percent accuracy. In the repair process, the RF introduces uncertainty to material planning. RFs are probability of need factors for replacement parts in the repair process. They are based on historical demand and are the basis for estimating the parts needed for future component repair. NADEP NI's current RF accuracy of 80 percent is unacceptable for accurate material planning.

## C. RECOMMENDATIONS

**1. The reward structure should be modified to promote communication and teamwork toward common goals at those organizations with a role in material planning for the component repair process.**

The author recommends establishing multi-functional teams comprised of key personnel from each responsible organization. They should be empowered to identify and enact solutions to improve forecast accuracy and material availability with the ultimate goals of reducing TAT and component inventories. All personnel in those organizations should be educated on the importance of this concept and the role that each individual plays in achieving that goal.

**2. The material lead-time should be reduced for those items that most persistently delay component repairs.**

Since planning must be greater than the longest material lead-time, the current two-quarter forecast horizon is inadequate for material planning. However, it isn't feasible to expect sufficient accuracy from an eight-quarter forecast. Reducing lead-time on those items that routinely take longer than one year to acquire can reduce the forecast horizon from the planned eight quarters to four quarters and will reduce G condition inventories by 2.3 million dollars.

**3. Material availability should be the primary focus in planning, not inventory accuracy.**

Inventory accuracy does not guarantee material availability. Most of the material required for component repairs are not stocked locally. The current procedure of initiating material procurement five weeks prior to the start of the execution quarter guarantees longer TAT, substantial G condition inventory, and reduced readiness for operating units. Assuming a four-quarter forecast, material procurement should commence four quarters prior to the requirement to ensure material is received when needed. Assuming this will reduce G-condition to less than 100 days, the savings from pipeline inventory reduction for the 26 sample FICs would reach 6.2 million dollars.

**4. The forecasting process should be improved to provide better information for resource planning.**

NAVICP-Phil should stress fleet input in forecasting component inductions so that the intensity and types of operations employed and their influence on component demand is considered. Variability can never be eliminated from military forecasts. However, since MRP II by nature is not demand-based, usage at the fleet level must considered in depth for the development of the most accurate forecast possible.

**5. RFs should continue to be used and refined for accurate prediction of component material requirements.**

Accurate RFs are essential for material planning in a repair job shop environment. Outstanding requisitions are not reflected in the NIBOM demand history database, which is used to calculate RFs. NADEP NI and FISC SD should conduct in-depth analyses on outstanding aged requisitions to determine if manual adjustments should be made to those RFs to more accurately reflect the actual probability of replacement during a repair.

## D. RECOMMENDATIONS FOR FURTHER STUDY

### 1. Four-Quarter Component Demand Forecast Model

A study of forecasting techniques to develop a model that will provide accurate forecasts of component repair requirements would be useful. Such a forecasting model would improve forecast accuracy over a broader horizon allowing more accurate material planning for the repair process.

### 2. Inventory Management Techniques For Improved Material Availability to Support Component Repair Processes.

A study chronic material availability problems with the objective of developing creative inventory management solutions would help ensure material is available when needed. Reducing lead-time in the hard-to-get parts will significantly reduce the planning horizon required and would benefit the overall repair process.

# APPENDIX A. SAMPLE BILL OF MATERIAL

*Bill of Material Report by IIC* 4/23/98

C:QBS4 FIC:HE3A Rshop:93606 Cog:7R FSC:6610 NIIN:011428323 SMIC:DA Std UP:$31,610.00

art Nbr:31103-A22A IPB:05-20GCA-6 Nomen:COMPUTER

| og | FSC | NIIN | Nomenclature | Part Number | Cage | UI | UPA | SMR CD | Unit Price Standard | Unit Price Surcharge | Net | Repl Factors Calc | Repl Factors Man | Repl Factors Prev |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| )Z | 5331 | 00-263-8028 | PACKING | MS29512-04 | 96906 | EA | 0 | | $0.03 | $0.03 | $0.00 | 0.00 | 0.00 | 0.00 |
| )G | 6695 | 00-350-7586 | BEARING ASSY. | 1625303-1 | 99251 | EA | 1 | | $6.13 | $6.99 | $0.00 | 0.01 | 0.00 | 0.01 |
| )Z | 5310 | 00-411-6492 | WASHER | 1603660-35 | 99251 | EA | 1 | | $0.34 | $0.39 | $0.00 | 0.05 | 0.00 | 0.05 |
| )Z | 5342 | 00-437-8691 | MOUNT,RESILIENT | 1622704-1 | 99251 | EA | 4 | | $26.42 | $32.40 | $0.00 | 0.05 | 0.00 | 0.05 |
| )Z | 3120 | 00-448-7391 | BEARING,WASHER,THRU | 1623464-1 | 99251 | EA | 2 | | $2.40 | $2.74 | $0.00 | 0.05 | 0.00 | 0.05 |
| )Z | 3120 | 00-448-7392 | BEARING | 1623464-2 | 99251 | EA | 4 | | $4.80 | $5.47 | | 0.00 | 0.00 | 0.00 |
| )G | 6610 | 00-477-7930 | SHAFT & PIVOT ASSY | 1622708-1 | 99251 | EA | 1 | | $60.60 | $69.08 | $0.00 | 0.03 | 0.00 | 0.03 |
| )G | 6610 | 00-477-7931 | SCREW AND NUT ASSEM | 1622249-1 | 99251 | EA | 1 | | $1,403.56 | $1,600.06 | $0.00 | 0.03 | 0.00 | 0.03 |
| )Z | 5365 | 00-489-8816 | WASHER, RUBBER | 1623262-1 | 99251 | EA | 2 | | $26.66 | $30.39 | $0.00 | 0.22 | 0.00 | 0.22 |
| )N | 5950 | 00-497-9006 | TRANSFORMER | 1623808-1 | 99251 | EA | 1 | | $129.24 | $147.33 | $0.00 | 0.06 | 0.00 | 0.06 |
| )G | 6610 | 00-531-8822 | FRAME AND BEARING A | 1622712-1 | 99251 | EA | 1 | | $511.32 | $582.90 | $0.00 | 0.02 | 0.00 | 0.02 |
| )Z | 5331 | 00-579-8108 | PACKING | MS28775-111 | 96906 | EA | 0 | | $0.04 | $0.05 | $0.00 | 0.00 | 0.00 | 0.00 |
| )Z | 5305 | 00-582-9493 | SET SCREW | AN565AC6L6 | 61352 | EA | 4 | | $9.97 | $11.37 | $0.00 | 0.00 | | 0.00 |
| )Z | 5305 | 00-843-2841 | SETSCREW | MS51021-1 | 96906 | HD | 0 | | $3.72 | $4.24 | $0.00 | 0.00 | 0.00 | 0.00 |
| )G | 6610 | 00-916-7447 | PAD,TRANSDUCER | 1604568-1 | 99251 | EA | 3 | | $1.32 | $1.50 | $0.00 | 0.04 | 0.00 | 0.04 |
| )G | 6610 | 00-916-9987 | SHAFT ASSY | 1623924-2 | 99251 | EA | 1 | | $545.07 | $621.38 | $0.00 | 0.05 | 0.00 | 0.05 |
| )Z | 3110 | 00-949-2040 | BEARING | S2CEP35LD | 40920 | EA | 1 | | $33.82 | $38.55 | $0.00 | 0.00 | 0.00 | 0.00 |
| )Z | 5340 | 00-959-4211 | CAP, PROTECTIVE | 613720-12 | 99251 | EA | 1 | | $2.61 | $3.20 | $0.00 | 0.54 | 0.00 | 0.55 |
| )G | 6610 | 01-131-5714 | ROD ASSEMBLY | 1623998-1 | 99251 | EA | 2 | | $362.60 | $413.36 | $0.00 | 0.05 | 0.00 | 0.05 |
| 9G | 6605 | 01-211-2793 | ENCODER ASSY | 1631716-1 | 99251 | EA | 1 | | $7,745.97 | $8,830.41 | $0.00 | 0.01 | 0.08 | 0.01 |
| 1R | 9999 | LL-LM4-0705 | DECAL | 89771 | 91145 | EA | 0 | | $6.63 | $6.83 | $0.00 | 0.00 | | 0.00 |
| 9Z | 5330 | LL-LP4-3594 | SEAL TAMPER | 1623342-1 | 99251 | EA | 2 | | $9.36 | $10.67 | $0.00 | 0.27 | 0.00 | 0.27 |

# APPENDIX B. COMPONENTS RESPONSIBLE FOR NADEP NI'S TOP 80 PERCENT OF REVENUE GENERATION

NADEP North Island
80% Revenue Generators

| Pri | NIIN | FIC | IIC | IND | RFI | Locked |
|---|---|---|---|---|---|---|
| 1 | 013399259 | MA6A | TD16 | 48 | 38 | YES |
| 1 | 013837736 | MA6A | VAJ2 | 4 | 4 | YES |
| 1 | 012019601 | MA6A | Q980 | 25 | 19 | YES |
| 2 | 013389696 | MBJA | TD17 | 46 | 37 | YES |
| 2 | 013837761 | MBJA | VAJ3 | 3 | 3 | YES |
| 2 | 012019639 | MBJA | Q990 | 24 | 18 | YES |
| 3 | 012204768 | GRMA | RQ45 | 196 | 133 | YES 11/21/96 |
| 3 | 011547537 | GRMA | QH89 | 4 | 1 | YES 11/21/96 |
| 3 | 013437026 | GRMA | T2W6 | 275 | 181 | YES 11/21/96 |
| 4 | 007227084 | Y0GB | C3A0 | 6 | 0 | YES 11/21/96 |
| 4 | 001827733 | Y0GB | G502 | 355 | 314 | YES 11/21/96 |
| 4 | 009280072 | Y0GB | EM37 | 334 | 303 | YES 11/21/96 |
| 5 | 001129255 | A4L6 | A4L6 | 128 | 108 | YES 11/21/96 |
| 7 | 011555728 | KR3A | QBW5 | 208 | 119 | NO |
| 7 | 011258858 | KR3A | PWV2 | 34 | 14 | NO |
| 8 | 011325865 | P484 | P484 | 104 | 76 | YES 11/21/96 |
| 9 | 011520853 | HCHA | QG96 | 107 | 48 | YES 11/21/96 |
| 9 | 011520854 | HCHA | QG97 | 28 | 19 | YES 11/21/96 |
| 10 | 012328815 | AE3A | RUQ4 | 376 | 333 | YES 11/21/96 |
| 10 | 012429595 | AE3A | RX25 | 6 | 6 | NO |
| 10 | 011136037 | AE3A | PK90 | 22 | 16 | YES 11/21/96 |
| 10 | 011351392 | AE3A | PW97 | 2 | 1 | YES 11/21/96 |
| 11 | 011133259 | FRSA | PPF6 | 216 | 102 | YES 11/21/96 |
| 11 | 006319680 | FRSA | K7G6 | 1 | 0 | NO |
| 12 | 011249243 | BB4A | PQ49 | 113 | 88 | YES |
| 13 | 011444269 | JSLA | P7W2 | 74 | 57 | YES 11/21/96 |
| 14 | 001792655 | C3NA | FMX3 | 96 | 88 | YES 11/21/96 |
| 14 | 001655838 | C3NA | H3E6 | 764 | 723 | YES 11/21/96 |
| 15 | 012789395 | HFFA | SKE2 | 45 | 38 | YES |
| 15 | 011867881 | HFFA | Q6E7 | 78 | 74 | YES |
| 15 | 011527087 | HFFA | QHF3 | 18 | 0 | NO |
| 15 | 011708884 | HFFA | QYH5 | 2 | 0 | NO |
| 15 | 013248752 | HFFA | TFM6 | 68 | 35 | YES |
| 16 | 001592298 | HQL2 | HQL2 | 309 | 292 | YES |
| 17 | 012321229 | RVX1 | RVX1 | 302 | 279 | YES |
| 18 | 013036743 | HBPA | U8U9 | 56 | 49 | YES 11/21/96 |
| 18 | 011625000 | HBPA | QM94 | 292 | 268 | YES 11/21/96 |
| 18 | 011542567 | HBPA | QG78 | 35 | 30 | YES 11/21/96 |
| 18 | 011190648 | HBPA | PPP1 | 7 | 6 | YES 11/21/96 |
| 19 | 004458090 | AW9A | G8B0 | 37 | 18 | NO |
| 19 | 013565287 | AW9A | UAB7 | 73 | 37 | NO |
| 19 | 010330185 | AW9A | LKK6 | 109 | 45 | YES 11/21/96 |
| 20 | 000783348 | HBVB | AUS7 | 11 | 7 | YES |
| 20 | 012015740 | HBVB | RB68 | 32 | 25 | YES |
| 20 | 003288317 | HBVB | J6D8 | 8 | 5 | YES |
| 21 | 006179551 | 5QQA | K2V7 | 61 | 43 | YES |
| 22 | 005386020 | KX93 | KX93 | 48 | 39 | YES 11/21/96 |

## NADEP North Island
## 80% Revenue Generators

| Pri | NIIN | FIC | IIC | IND | RFI | Locked |
|---|---|---|---|---|---|---|
| 23 | 009611691 | HC3A | E0F8 | 288 | 279 | YES 11/21/96 |
| 24 | 009868995 | 5DKA | E698 | 400 | 344 | YES 11/21/96 |
| 24 | 001827698 | 5DKA | G4P9 | 120 | 117 | YES 11/21/96 |
| 25 | 001167534 | WCWA | A609 | 20 | 17 | YES 11/21/96 |
| 25 | 008823103 | WCWA | JC40 | 62 | 46 | YES 11/21/96 |
| 26 | 013513373 | HF2A | T3D2 | 187 | 114 | YES 11/21/96 |
| 26 | 011708388 | HF2A | QJA8 | 29 | 16 | YES 11/21/96 |
| 26 | 011614420 | HF2A | QJA7 | 1 | 1 | YES 11/21/96 |
| 26 | 011257361 | HF2A | P109 | 1 | 0 | NO |
| 27 | 000897912 | CFVA | AXE9 | 98 | 76 | YES 11/21/96 |
| 27 | 001688308 | CFVA | G5S4 | 145 | 105 | YES 11/21/96 |
| 27 | 011473098 | CFVA | P479 | 145 | 59 | YES 11/21/96 |
| 28 | 011506731 | BS6A | QCH7 | 42 | 29 | YES |
| 28 | 011360866 | BS6A | P8W1 | 1 | 1 | YES |
| 28 | 011440122 | BS6A | P6V3 | 1 | 0 | YES |
| 28 | 011440121 | BS6A | P6V2 | 1 | 1 | NO |
| 28 | 011440123 | BS6A | P6W7 | 1 | 0 | YES |
| 29 | 006191673 | HP05 | HP05 | 159 | 116 | YES 11/21/96 |
| 30 | 011520840 | FPUA | QHA4 | 10 | 8 | YES 11/21/96 |
| 30 | 011636069 | FPUA | QND2 | 1 | 1 | YES 11/21/96 |
| 30 | 013477867 | FPUA | T0L5 | 3 | 2 | NO |
| 30 | 012133876 | FPUA | RK22 | 63 | 33 | YES 11/21/96 |
| 30 | 013833284 | FPUA | VCL6 | 7 | 3 | NO |
| 30 | 013037683 | FPUA | SV86 | 3 | 1 | YES 11/21/96 |
| 30 | 011435746 | FPUA | P662 | 4 | 2 | YES 11/21/96 |
| 30 | 011468357 | FPUA | P660 | 4 | 2 | YES 11/21/96 |
| 31 | 013477866 | FQAA | T0J7 | 7 | 5 | NO |
| 31 | 012133877 | FQAA | RK23 | 63 | 30 | YES 11/21/96 |
| 31 | 011636070 | FQAA | QND3 | 1 | 1 | YES 11/21/96 |
| 31 | 011520841 | FQAA | QHA5 | 7 | 6 | YES 11/21/96 |
| 31 | 013001618 | FQAA | SV87 | 1 | 0 | YES 11/21/96 |
| 31 | 013833294 | FQAA | VCL9 | 5 | 3 | NO |
| 31 | 011581771 | FQAA | P663 | 6 | 5 | YES 11/21/96 |
| 31 | 011561137 | FQAA | P661 | 1 | 1 | YES 11/21/96 |
| 32 | 013574345 | PQQA | UAG1 | 5 | 5 | YES |
| 32 | 013581161 | PQQA | UAL8 | 4 | 4 | YES |
| 32 | 013432609 | PQQA | T1S0 | 184 | 178 | YES |
| 33 | 012061331 | 6CXA | RFQ7 | 105 | 51 | YES 11/21/96 |
| 34 | 005386027 | 2YNA | KX94 | 34 | 27 | YES 11/21/96 |
| 35 | 010030803 | 3KMA | K346 | 397 | 346 | YES |
| 36 | 001222353 | BCMA | KV90 | 1 | 0 | YES 11/21/96 |
| 36 | 010144050 | BCMA | K903 | 43 | 15 | YES 11/21/96 |
| 37 | 013477869 | GKTA | T5P0 | 3 | 1 | NO |
| 37 | 011581774 | GKTA | QJG1 | 29 | 16 | YES 11/21/96 |
| 37 | 011468361 | GKTA | P9F6 | 5 | 3 | YES 11/21/96 |
| 38 | 001525089 | HTU6 | HTU6 | 579 | 520 | YES 11/21/96 |
| 39 | 012429594 | AG7A | RX21 | 109 | 71 | YES 11/21/96 |

## NADEP North Island
## 80% Revenue Generators

| Pri | NIIN | FIC | IIC | IND | RFI | Locked |
|---|---|---|---|---|---|---|
| 39 | 011518137 | AG7A | P649 | 24 | 20 | YES 11/21/96 |
| 39 | 011403258 | AG7A | PPM1 | 1 | 0 | YES 11/21/96 |
| 40 | 012823598 | SSW0 | SSW0 | 75 | 68 | YES |
| 41 | 004338871 | 1X1A | KUV4 | 48 | 10 | NO |
| 42 | 008320935 | 5BFA | JF80 | 1 | 0 | NO |
| 42 | 004134976 | 5BFA | KS68 | 12 | 5 | YES 11/21/96 |
| 42 | 010093123 | 5BFA | K8C3 | 45 | 26 | YES |
| 43 | 006302325 | 4TMA | K0R8 | 266 | 236 | YES |
| 44 | 001462214 | HXG1 | HXG1 | 35 | 30 | YES 11/21/96 |
| 45 | 001151245 | CHWB | 6TD8 | 621 | 495 | YES |
| 45 | 001151248 | CHWB | 6SQ9 | 173 | 147 | YES |
| 46 | 004134978 | 2BNA | KS69 | 2 | 1 | YES 11/21/96 |
| 46 | 010152497 | 2BNA | K8C2 | 46 | 24 | YES 11/21/96 |
| 47 | 010041771 | 3JEA | K534 | 4 | 4 | YES |
| 47 | 010041772 | 3JEA | K535 | 5 | 4 | YES |
| 47 | 010127491 | 3JEA | LTJ3 | 53 | 43 | YES |
| 47 | 002747128 | 3JEA | KSL2 | 1 | 1 | YES |
| 48 | 011581773 | GKRA | QJD1 | 25 | 10 | YES 11/21/96 |
| 48 | 013159426 | GKRA | STB5 | 1 | 1 | NO |
| 48 | 013480966 | GKRA | T5R0 | 1 | 0 | NO |
| 48 | 011468359 | GKRA | P9F4 | 3 | 3 | NO |
| 49 | 001462213 | HXG0 | HXG0 | 33 | 31 | YES 11/21/96 |
| 50 | 010639553 | 5ANA | NN88 | 76 | 62 | YES |
| 50 | 010175231 | 5ANA | LCF3 | 7 | 5 | NO |
| 50 | 005227596 | 5ANA | KW20 | 5 | 4 | NO |
| 51 | 002453022 | JAJ9 | JAJ9 | 48 | 33 | YES 11/21/96 |
| 52 | 011557014 | G55A | QCN3 | 82 | 74 | NO |
| 53 | 010765218 | AEXA | NSU1 | 43 | 36 | YES 11/21/96 |
| 53 | 010527002 | AEXA | L2W9 | 1 | 1 | YES 11/21/96 |
| 54 | 011311435 | PWC4 | PWC4 | 274 | 245 | YES 11/21/96 |
| 55 | 011402298 | L5RA | QFA0 | 95 | 93 | YES |
| 56 | 004338870 | 1X0A | KUV3 | 40 | 14 | NO |
| 57 | 002452603 | DL2A | JAH3 | 38 | 14 | YES 11/21/96 |
| 57 | 011342326 | DL2A | PU88 | 1 | 0 | NO |
| 58 | 001795086 | A8TA | FMY8 | 191 | 182 | YES 11/21/96 |
| 58 | 008872068 | A8TA | D780 | 46 | 41 | YES 11/21/96 |
| 58 | 000863840 | A8TA | JYH4 | 52 | 50 | YES 11/21/96 |
| 59 | 000872636 | CHEA | AWF7 | 8 | 5 | NO |
| 59 | 000872632 | CHEA | AWF6 | 23 | 19 | NO |
| 59 | 012265321 | CHEA | RR84 | 176 | 149 | YES 11/21/96 |
| 59 | 010251289 | CHEA | LCV3 | 13 | 10 | NO |
| 59 | 010204215 | CHEA | LFQ1 | 44 | 29 | NO |
| 60 | 010175386 | DR4A | LCF2 | 66 | 57 | YES |
| 61 | 009428197 | PXBA | ETJ4 | 317 | 177 | |
| 63 | 013833273 | EBLA | VCL0 | 13 | 7 | NO |
| 63 | 013013241 | EBLA | SV84 | 43 | 26 | YES 11/21/96 |
| 64 | 010030960 | 6L6A | K488 | 125 | 113 | YES |

## NADEP North Island
## 80% Revenue Generators

| Pri | NIIN | FIC | IIC | IND | RFI | Locked | |
|---|---|---|---|---|---|---|---|
| 65 | 010045575 | 42JA | K6H5 | 72 | 68 | YES | 11/21/96 |
| 65 | 010118485 | 42JA | K951 | 95 | 92 | YES | 11/21/96 |
| 65 | 010390761 | 42JA | LV55 | 4 | 4 | NO | |
| 66 | 010265516 | K7Y1 | K7Y1 | 50 | 32 | YES | 11/21/96 |
| 67 | 014080379 | CASA | VRN4 | 2 | 2 | NO | |
| 68 | 001164020 | A6U5 | A6U5 | 174 | 161 | YES | 11/21/96 |
| 69 | 008710592 | D2V0 | D2V0 | 251 | 163 | YES | 11/21/96 |
| 70 | 012265320 | A54A | RR73 | 164 | 147 | YES | 11/21/96 |
| 71 | 012204746 | GRUA | RQ36 | 5 | 2 | YES | 11/21/96 |
| 71 | 012204747 | GRUA | RQ37 | 12 | 7 | YES | 11/21/96 |
| 71 | 011636075 | GRUA | QNB9 | 4 | 1 | YES | 11/21/96 |
| 71 | 011821943 | GRUA | Q5B2 | 2 | 0 | YES | 11/21/96 |
| 71 | 011839795 | GRUA | Q5E8 | 1 | 0 | YES | 11/21/96 |
| 71 | 011821942 | GRUA | Q5B1 | 2 | 0 | YES | 11/21/96 |
| 72 | 010127356 | 5CGA | LA78 | 5 | 4 | YES | 11/21/96 |
| 72 | 011289935 | 5CGA | PVA0 | 71 | 57 | YES | 11/21/96 |
| 73 | 001105664 | UY6A | J236 | 94 | 61 | YES | |
| 74 | 013833312 | BHQA | VCM3 | 10 | 6 | YES | 11/21/96 |
| 74 | 012996782 | BHQA | SV85 | 40 | 33 | YES | 11/21/96 |
| 75 | 009008194 | MDRA | EBA1 | 40 | 0 | YES | 11/21/96 |
| 75 | 011290138 | MDRA | P6B5 | 118 | 97 | YES | 11/21/96 |
| 76 | 012906517 | R570 | R570 | 283 | 197 | NO | |
| 78 | 001174629 | A7H8 | A7H8 | 244 | 215 | YES | 11/21/96 |
| 79 | 012405562 | G5YA | RW12 | 61 | 36 | YES | 11/21/96 |
| 79 | 011506719 | G5YA | QCM3 | 92 | 33 | YES | 11/21/96 |
| 80 | 001618782 | HW44 | HW44 | 199 | 121 | YES | 11/21/96 |
| 81 | 002948890 | KF86 | KF86 | 135 | 103 | YES | |
| 82 | 011415724 | 0N6A | QGB9 | 64 | 38 | YES | |
| 82 | 010788742 | 0N6A | N0B3 | 14 | 7 | YES | |
| 83 | 011520846 | JW7A | QHH3 | 64 | 33 | YES | |
| 83 | 011708379 | JW7A | QSJ6 | 10 | 3 | YES | |
| 84 | 010295038 | 3U0A | LJ02 | 46 | 39 | YES | |
| 85 | 001506897 | 0AKA | HG24 | 8 | 8 | NO | |
| 85 | 001067552 | 0AKA | JSP0 | 31 | 23 | YES | 11/21/96 |
| 85 | 010395020 | 0AKA | LJ92 | 91 | 53 | YES | 11/21/96 |
| 85 | 001341824 | 0AKA | KSB4 | 46 | 34 | YES | 11/21/96 |
| 86 | 013042152 | LTCA | S358 | 57 | 48 | YES | 11/21/96 |
| 86 | 011190647 | LTCA | PPN9 | 101 | 90 | YES | 11/21/96 |
| 87 | 013416041 | PCNA | T2H8 | 121 | 118 | YES | |
| 88 | 011542867 | GQFA | QJA6 | 6 | 4 | YES | 11/21/96 |
| 88 | 011861672 | GQFA | Q568 | 112 | 80 | YES | 11/21/96 |
| 89 | 002924779 | FHQA | KC22 | 205 | 178 | YES | |
| 90 | 011258013 | P2M4 | P2M4 | 42 | 39 | YES | 11/21/96 |
| 91 | 013181228 | ER0A | S4A4 | 55 | 31 | NO | |
| 92 | 010734475 | 0DXA | NTT1 | 21 | 14 | YES | |
| 93 | 001679800 | HE3A | BCJ7 | 14 | 11 | YES | 11/21/96 |
| 93 | 011428323 | HE3A | QBS4 | 125 | 106 | YES | 11/21/96 |

## NADEP North Island
## 80% Revenue Generators

| Pri | NIIN | FIC | IIC | IND | RFI | Locked |
|---|---|---|---|---|---|---|
| 94 | 001270242 | 5NNA | K4Q1 | 132 | 95 | YES |
| 95 | 000870629 | KE2A | AWE0 | 47 | 43 | YES 11/21/96 |
| 95 | 000985309 | KE2A | A0V1 | 82 | 79 | YES 11/21/96 |
| 96 | 013137374 | C7WA | STB4 | 18 | 8 | YES 11/21/96 |
| 97 | 011708280 | MDBA | QVN1 | 196 | 169 | YES |
| 97 | 011708279 | MDBA | QVN0 | 27 | 16 | YES 11/21/96 |
| 97 | 011444413 | MDBA | PWL9 | 71 | 67 | YES 11/21/96 |
| 98 | 001473199 | HTV1 | HTV1 | 219 | 150 | YES 11/21/96 |
| 99 | 011515805 | A21A | P9P3 | 98 | 73 | YES |
| 100 | 006902038 | JCF2 | JCF2 | 98 | 65 | YES 11/21/96 |
| 102 | 001194525 | 280A | A7Y1 | 12 | 6 | NO |
| 102 | 001389617 | 280A | KY25 | 30 | 19 | NO |
| 102 | 005124202 | 280A | KWH4 | 3 | 0 | YES |
| 103 | 001462172 | AVBA | HW83 | 1 | 1 | NO |
| 103 | 010959170 | AVBA | N733 | 27 | 16 | YES 11/21/96 |
| 104 | 002453109 | JAK0 | JAK0 | 29 | 23 | YES 11/21/96 |
| 105 | 013821500 | VB88 | VB88 | 40 | 19 | NO |
| 106 | 007805788 | DC27 | DC27 | 230 | 116 | YES |
| 107 | 002452601 | C8MA | JAH2 | 24 | 9 | NO |
| 107 | 011336907 | C8MA | PU87 | 1 | 0 | NO |
| 107 | 012537037 | C8MA | R8Q0 | 2 | 0 | NO |
| 108 | 012653659 | EXTA | R8W7 | 115 | 64 | YES |
| 108 | 011435941 | EXTA | P610 | 13 | 7 | YES |
| 109 | 012643953 | SAM6 | SAM6 | 107 | 79 | YES 11/21/96 |
| 111 | 001489231 | KC96 | KC96 | 19 | 12 | YES 11/21/96 |
| 112 | 011771963 | Q2H4 | Q2H4 | 112 | 98 | YES 11/21/96 |
| 113 | 009335950 | J6LA | EPT4 | 16 | 9 | YES 11/21/96 |
| 113 | 001655827 | J6LA | HVW2 | 45 | 30 | YES 11/21/96 |
| 113 | 005908270 | J6LA | CDV7 | 92 | 78 | YES 11/21/96 |
| 114 | 001345625 | CR1A | LYA1 | 128 | 100 | YES 11/21/96 |
| 114 | 010550468 | CR1A | L5D5 | 42 | 31 | YES 11/21/96 |
| 115 | 013160316 | C79A | STB3 | 16 | 11 | YES 11/21/96 |
| 116 | 013416039 | 6LEA | T2H7 | 23 | 16 | YES 11/21/96 |
| 116 | 010538768 | 6LEA | L6T6 | 3 | 1 | YES 11/21/96 |
| 116 | 011293569 | 6LEA | PYY6 | 56 | 32 | YES 11/21/96 |
| 117 | 002814779 | KKQ2 | KKQ2 | 17 | 9 | YES |
| 118 | 009965278 | A2MA | E9T8 | 14 | 10 | YES 11/21/96 |
| 118 | 013705742 | A2MA | U5B4 | 3 | 3 | NO |
| 118 | 012517201 | A2MA | R2B3 | 1 | 1 | YES 11/21/96 |
| 118 | 010439782 | A2MA | LXT2 | 30 | 30 | YES 11/21/96 |
| 119 | 004217726 | HAT9 | HAT9 | 168 | 149 | YES |
| 120 | 005674548 | BA0A | K015 | 101 | 94 | YES 11/21/96 |
| 120 | 011374682 | BA0A | PYJ3 | 219 | 195 | YES |
| 121 | 012054796 | N5LA | RTT1 | 61 | 41 | YES |
| 122 | 010228572 | DD8A | K8F1 | 36 | 21 | YES |
| 122 | 010309464 | DD8A | LGT2 | 9 | 4 | NO |
| 123 | 010164134 | 4AHA | K7Y7 | 19 | 3 | NO |

## NADEP North Island
## 80% Revenue Generators

| Pri | NIIN | FIC | IIC | IND | RFI | Locked |
|---|---|---|---|---|---|---|
| 123 | 010146964 | 4AHA | LA34 | 1 | 1 | NO |
| 124 | 001101748 | JYM4 | JYM4 | 113 | 90 | YES |
| 125 | 012423760 | NRWA | R1P5 | 122 | 91 | YES |
| 126 | 013960641 | HNBA | VHW1 | 13 | 12 | YES |
| 126 | 013920601 | HNBA | VED2 | 53 | 23 | YES 11/21/96 |
| 126 | 011520865 | HNBA | QHH2 | 70 | 52 | YES 11/21/96 |
| 126 | 012679908 | HNBA | SSN1 | 68 | 62 | YES 11/21/96 |
| 127 | 010882352 | ASMA | N542 | 119 | 110 | YES |
| 127 | 010345226 | ASMA | LJ89 | 7 | 5 | YES |
| 128 | 005432534 | MS7A | B7B1 | 171 | 147 | YES |
| 128 | 001488307 | MS7A | KWQ0 | 2 | 2 | YES |
| 128 | 012300197 | MS7A | RWP9 | 236 | 211 | YES |
| 129 | 001590841 | JX85 | JX85 | 31 | 25 | NO |
| 130 | 001462189 | HW94 | HW94 | 22 | 10 | NO |
| 131 | 009186727 | MA9A | EJ17 | 37 | 33 | YES |
| 131 | 010978747 | MA9A | PDW5 | 72 | 63 | YES |
| 132 | 004428061 | E1RA | LYE6 | 6 | 3 | YES 11/21/96 |
| 132 | 010802827 | E1RA | N0H4 | 87 | 46 | YES 11/21/96 |
| 133 | 012714485 | E3MA | SF18 | 74 | 72 | YES |
| 133 | 011460316 | E3MA | P622 | 8 | 7 | YES |
| 133 | 011258875 | E3MA | PWV5 | 2 | 2 | NO |
| 133 | 011755608 | E3MA | QVR1 | 15 | 14 | YES |
| 134 | 007196882 | LN2A | C2Q8 | 360 | 351 | YES |
| 135 | 010113449 | 5RPA | K663 | 135 | 128 | YES 11/21/96 |
| 135 | 010152470 | 5RPA | K934 | 14 | 11 | YES 11/21/96 |
| 136 | 011435655 | PWA3 | PWA3 | 193 | 171 | YES 11/21/96 |
| 137 | 013024449 | R6N9 | R6N9 | 151 | 98 | YES |
| 138 | 002453019 | A5PA | JAJ7 | 3 | 3 | NO |
| 138 | 010313860 | A5PA | LWR9 | 21 | 19 | NO |
| 139 | 005316389 | K34A | B531 | 75 | 59 | YES |
| 139 | 006638694 | K34A | CR33 | 38 | 17 | YES |
| 140 | 010228659 | 42LA | K952 | 123 | 113 | YES 11/21/96 |
| 140 | 010045857 | 42LA | K6H6 | 56 | 48 | YES 11/21/96 |
| 141 | 013294431 | THT4 | THT4 | 110 | 76 | YES |
| 142 | 001167532 | A607 | A607 | 65 | 60 | YES |
| 143 | 010488044 | LXT1 | LXT1 | 33 | 22 | YES 11/21/96 |
| 144 | 000198390 | C6PA | ADA0 | 76 | 65 | YES |
| 144 | 009069917 | C6PA | EC45 | 143 | 128 | YES |
| 145 | 012567287 | R6D0 | R6D0 | 151 | 118 | YES |
| 146 | 013436950 | PE4A | T2W2 | 14 | 7 | NO |
| 146 | 012917094 | PE4A | STC8 | 4 | 4 | NO |
| 147 | 005872517 | 6DBA | K451 | 5 | 5 | NO |
| 147 | 011325908 | 6DBA | P485 | 114 | 91 | YES 11/21/96 |
| 148 | 001531338 | HTW0 | HTW0 | 288 | 190 | YES 11/21/96 |
| 149 | 010130942 | LAW6 | LAW6 | 72 | 31 | YES 11/21/96 |
| 150 | 001690556 | AUWA | HEJ1 | 2 | 2 | YES 11/21/96 |
| 150 | 001263350 | AUWA | K414 | 5 | 4 | YES 11/21/96 |

## NADEP North Island
## 80% Revenue Generators

| Pri | NIIN | FIC | IIC | IND | RFI | Locked |
|---|---|---|---|---|---|---|
| 150 | 013617332 | AUWA | UCH2 | 14 | 14 | YES 11/21/96 |
| 151 | 010049816 | 6A8A | K3X7 | 12 | 7 | NO |
| 151 | 002764157 | 6A8A | KKL0 | 3 | 1 | NO |
| 152 | 010333754 | B1FA | L1A6 | 45 | 35 | YES |
| 153 | 004858099 | HR3A | 6NH5 | 86 | 52 | YES |
| 153 | 011729446 | HR3A | QS87 | 18 | 14 | YES |
| 154 | 012571966 | H3XA | SB08 | 30 | 12 | NO |
| 155 | 012727994 | JWVA | SHP9 | 3 | 3 | NO |
| 155 | 011544780 | JWVA | QCJ9 | 42 | 33 | YES 11/21/96 |
| 156 | 005854132 | FSQA | CCC3 | 5 | 4 | NO |
| 156 | 006207888 | FSQA | CKA6 | 2 | 1 | NO |
| 156 | 005278356 | FSQA | B5P6 | 1 | 0 | NO |
| 156 | 008116070 | FSQA | DMW6 | 26 | 20 | NO |
| 156 | 010045856 | FSQA | QLY9 | 61 | 35 | NO |
| 157 | 009699480 | E239 | E239 | 101 | 75 | YES 11/21/96 |
| 158 | 010481284 | 5YQA | LXY8 | 160 | 143 | YES |
| 159 | 010295759 | LKB8 | LKB8 | 26 | 6 | YES |
| 160 | 004022524 | QANA | GME2 | 5 | 5 | YES 11/21/96 |
| 160 | 012314819 | QANA | RVW1 | 82 | 25 | YES 11/21/96 |
| 161 | 011310640 | P6U5 | P6U5 | 36 | 30 | NO |
| 162 | 009998059 | G4VA | FA14 | 2 | 1 | YES 11/21/96 |
| 162 | 001068508 | G4VA | JYK1 | 46 | 39 | YES 11/21/96 |
| 162 | 006888478 | G4VA | CV55 | 4 | 2 | YES 11/21/96 |
| 162 | 013848736 | G4VA | VAS5 | 1 | 1 | YES |
| 163 | 011872334 | BTUB | Q6K1 | 5 | 3 | NO |
| 163 | 001138219 | BTUB | KY14 | 10 | 4 | NO |
| 164 | 009023520 | BTJA | EBG8 | 18 | 7 | YES 11/21/96 |
| 164 | 001249917 | BTJA | KYB3 | 149 | 82 | YES 11/21/96 |
| 165 | 011677491 | E1PA | QH45 | 101 | 88 | YES 11/21/96 |
| 166 | 000216755 | AEG6 | AEG6 | 215 | 189 | YES 11/21/96 |
| 167 | 012016153 | NWYA | Q979 | 52 | 38 | YES |
| 168 | 001101119 | TP2A | JYL1 | 39 | 17 | NO |
| 168 | 001684341 | TP2A | G7F0 | 3 | 2 | NO |
| 169 | 011594773 | P9T5 | P9T5 | 78 | 39 | YES |
| 170 | 001341530 | VH5A | KP59 | 66 | 49 | NO |
| 171 | 001692250 | 01JA | J3L0 | 31 | 26 | NO |
| 172 | 001340130 | BAR7 | BAR7 | 113 | 77 | YES 11/21/96 |
| 173 | 010492501 | CTCA | LXY9 | 52 | 43 | YES |
| 174 | 010393707 | LHK3 | LHK3 | 96 | 58 | YES |
| 175 | 001515363 | EEQA | HFF7 | 43 | 42 | NO |
| 175 | 009280216 | EEQA | EM72 | 15 | 14 | YES 11/21/96 |
| 175 | 012427236 | EEQA | R0F3 | 14 | 13 | NO |
| 175 | 010639054 | EEQA | L8Y0 | 107 | 102 | YES 11/21/96 |
| 176 | 010912877 | N422 | N422 | 57 | 19 | NO |
| 177 | 011489826 | PPH4 | PPH4 | 73 | 36 | YES 11/21/96 |
| 178 | 001288178 | K1TA | K5G4 | 65 | 41 | YES |
| 179 | 013360460 | PB2B | TET2 | 136 | 126 | YES |

## NADEP North Island
## 80% Revenue Generators

| Pri | NIIN | FIC | IIC | IND | RFI | Locked |
|---|---|---|---|---|---|---|
| 179 | 011790553 | PB2B | Q2W3 | 76 | 69 | YES 11/21/96 |
| 180 | 013280444 | 5VEA | TEY5 | 1 | 1 | NO |
| 180 | 010378700 | 5VEA | L1B5 | 58 | 57 | YES |
| 180 | 010302821 | 5VEA | L6N1 | 1 | 1 | NO |
| 181 | 011237973 | BYFA | PU99 | 175 | 153 | YES 11/21/96 |
| 182 | 009181982 | MHBA | EJM5 | 116 | 84 | YES 11/21/96 |
| 183 | 011395544 | PWE1 | PWE1 | 134 | 23 | |
| 184 | 011522310 | G16A | QCC8 | 114 | 113 | YES 11/21/96 |
| 185 | 004358932 | KUR8 | KUR8 | 152 | 133 | YES |
| 186 | 002453021 | A5KA | JAJ8 | 2 | 2 | NO |
| 186 | 010313859 | A5KA | LWR8 | 15 | 14 | NO |
| 187 | 009157868 | LXTA | EHT0 | 19 | 17 | YES |
| 187 | 008032346 | LXTA | DLL0 | 52 | 43 | YES |
| 187 | 012660999 | LXTA | SA41 | 41 | 40 | YES |
| 188 | 010091406 | LAD2 | LAD2 | 78 | 58 | NO |
| 189 | 009156878 | EHJ0 | EHJ0 | 45 | 44 | YES 11/21/96 |
| 190 | 011987705 | RC36 | RC36 | 167 | 131 | YES 11/21/96 |
| 191 | 005051671 | MTP4 | MTP4 | 55 | 41 | YES |
| 192 | 007557169 | C800 | C800 | 191 | 121 | YES 11/21/96 |
| 193 | 002527914 | J9V3 | J9V3 | 53 | 35 | YES |
| 194 | 012225163 | RMA0 | RMA0 | 43 | 38 | NO |
| 195 | 009192188 | LQAA | EKG0 | 3 | 3 | NO |
| 195 | 010478368 | LQAA | LX67 | 40 | 30 | YES |
| 195 | 002347118 | LQAA | QXL8 | 15 | 11 | NO |
| 195 | 011763649 | LQAA | QW57 | 123 | 95 | YES |
| 196 | 013574406 | FT8B | UAH6 | 20 | 19 | YES |
| 196 | 010936979 | FT8B | PGA1 | 46 | 39 | YES |
| 197 | 004056461 | C8RA | HR67 | 86 | 74 | YES 11/21/96 |
| 197 | 001680797 | C8RA | BCN0 | 1 | 1 | YES 11/21/96 |
| 198 | 010796685 | NU44 | NU44 | 71 | 59 | YES |
| 199 | 001462190 | JNU6 | JNU6 | 13 | 6 | NO |
| 200 | 009965281 | HHYA | E9U1 | 23 | 16 | YES |
| 200 | 011560788 | HHYA | QJM5 | 26 | 23 | YES |
| 201 | 008911592 | AFLA | D850 | 36 | 13 | YES 11/21/96 |
| 201 | 009349088 | AFLA | EP32 | 20 | 8 | NO |
| 201 | 000141773 | AFLA | ABM7 | 3 | 0 | NO |
| 202 | 007575816 | ARWA | HNU1 | 1 | 1 | YES 11/21/96 |
| 202 | 010827188 | ARWA | NX22 | 95 | 94 | YES 11/21/96 |
| 203 | 011614443 | HHXA | QJC8 | 185 | 163 | YES |
| 204 | 000049766 | JQD5 | JQD5 | 71 | 55 | NO |
| 205 | 011567310 | QB77 | QB77 | 57 | 26 | YES 11/21/96 |
| 206 | 013759999 | M45A | U8L9 | 56 | 41 | YES |
| 206 | 013143593 | M45A | S4H6 | 19 | 19 | YES |
| 206 | 011049349 | M45A | PE26 | 19 | 2 | NO |
| 207 | 009639444 | J3HA | E1J8 | 259 | 229 | YES |
| 207 | 011407620 | J3HA | P481 | 641 | 621 | YES |
| 208 | 010221862 | 5KPA | LB72 | 26 | 12 | YES |

## NADEP North Island
## 80% Revenue Generators

| Pri | NIIN | FIC | IIC | IND | RFI | Locked |
|---|---|---|---|---|---|---|
| 208 | 011585975 | 5KPA | QK46 | 61 | 46 | YES |
| 208 | 010166532 | 5KPA | LB73 | 23 | 9 | YES |
| 209 | 001047326 | A127 | A127 | 48 | 13 | NO |
| 210 | 001823133 | G665 | G665 | 123 | 76 | YES 11/21/96 |
| 211 | 002833914 | KKH7 | KKH7 | 11 | 6 | YES |
| 212 | 011136033 | PK86 | PK86 | 106 | 65 | YES 11/21/96 |
| 213 | 010045654 | K536 | K536 | 28 | 25 | YES 11/21/96 |
| 214 | 011100735 | 32PA | PM50 | 173 | 159 | YES 11/21/96 |
| 215 | 011788617 | Q2P6 | Q2P6 | 50 | 38 | YES 11/21/96 |
| 216 | 004860546 | HKLA | H9D9 | 236 | 144 | YES |
| 217 | 007195228 | C2A8 | C2A8 | 93 | 88 | YES |
| 218 | 010228570 | 4M1A | K659 | 75 | 62 | YES 11/21/96 |
| 218 | 010258739 | 4M1A | K932 | 16 | 14 | YES 11/21/96 |
| 219 | 003897956 | CNKA | KRR5 | 15 | 15 | NO |
| 219 | 010520189 | CNKA | L212 | 27 | 25 | YES 11/21/96 |
| 220 | 012204519 | PHGB | RQX1 | 8 | 5 | NO |
| 220 | 012231619 | PHGB | RLF7 | 28 | 19 | NO |
| 221 | 009123104 | EGT2 | EGT2 | 95 | 65 | YES 11/21/96 |
| 222 | 010864200 | GF8A | P562 | 34 | 21 | NO |
| 223 | | G4GA | VRF2 | 17 | 12 | NO |
| 223 | 011529779 | G4GA | QG49 | 4 | 2 | YES 11/21/96 |
| 223 | 011529778 | G4GA | QG48 | 3 | 3 | YES 11/21/96 |
| 223 | 011692574 | G4GA | QX28 | 15 | 13 | YES 11/21/96 |
| 223 | 011742122 | G4GA | QVM8 | 12 | 8 | YES 11/21/96 |
| 223 | 011822077 | G4GA | Q5B5 | 94 | 81 | YES 11/21/96 |
| 224 | 001376532 | AF7A | KX99 | 47 | 32 | YES |
| 225 | 011625010 | HBHA | QG66 | 1 | 0 | NO |
| 225 | 011512890 | HBHA | QHD3 | 29 | 18 | NO |
| 227 | 011257196 | P1Y0 | P1Y0 | 211 | 113 | YES 11/21/96 |
| 228 | 012502685 | ABEA | R2R6 | 60 | 44 | NO |
| 229 | 009309082 | EGTA | ENU9 | 1 | 0 | NO |
| 229 | 004102842 | EGTA | FS37 | 1 | 0 | NO |
| 229 | 001690637 | EGTA | HE46 | 54 | 16 | YES 11/21/96 |
| 230 | 009331802 | EPH2 | EPH2 | 141 | 97 | YES 11/21/96 |
| 231 | 012225158 | RL93 | RL93 | 83 | 69 | YES |
| 232 | 011630293 | A4XA | QNA1 | 62 | 60 | YES |
| 233 | 003462708 | KNK1 | KNK1 | 8 | 5 | YES 11/21/96 |
| 234 | 013620228 | GSPA | UCL2 | 19 | 10 | YES |
| 234 | 011452538 | GSPA | PWB7 | 20 | 14 | YES |
| 235 | 013351399 | DWWA | TFV5 | 13 | 9 | YES 11/21/96 |
| 235 | 011544774 | DWWA | QHC9 | 61 | 38 | YES 11/21/96 |
| 235 | 011271946 | DWWA | PSN7 | 1 | 0 | YES 11/21/96 |
| 236 | 011076966 | MFLA | PK82 | 25 | 8 | YES |
| 236 | 012653660 | MFLA | R8W9 | 47 | 20 | YES |
| 237 | 007176091 | LM5A | C1J9 | 48 | 45 | YES |
| 237 | 005049031 | LM5A | B1Q8 | 17 | 0 | YES |
| 237 | 007944748 | LM5A | DHH7 | 37 | 32 | YES |

## NADEP North Island
## 80% Revenue Generators

| Pri | NIIN | FIC | IIC | IND | RFI | Locked |
|---|---|---|---|---|---|---|
| 238 | 012917093 | STC7 | STC7 | 12 | 7 | YES |
| 239 | 000666325 | AP68 | AP68 | 23 | 23 | NO |
| 240 | 012225182 | RL99 | RL99 | 65 | 57 | YES |
| 241 | 009060598 | XVRA | EB65 | 97 | 63 | YES |
| 241 | 009190662 | XVRA | EKD9 | 3 | 3 | YES |
| 242 | 012343358 | BS5A | RUU3 | 15 | 8 | YES |
| 242 | 013448678 | BS5A | T0L3 | 16 | 7 | YES |
| 243 | 004675763 | KXT0 | KXT0 | 24 | 12 | YES 11/21/96 |
| 244 | 004795033 | 32XA | JAS8 | 1 | 1 | NO |
| 244 | 001389683 | 32XA | K0U5 | 20 | 10 | NO |
| 245 | 000109714 | AAT7 | AAT7 | 77 | 66 | YES 11/21/96 |
| 246 | 013130126 | BHLA | STC2 | 13 | 7 | NO |
| 246 | 012567405 | BHLA | R3L2 | 12 | 8 | NO |
| 247 | 012132135 | AUCA | RKV1 | 41 | 37 | NO |
| 248 | 001525091 | HTV0 | HTV0 | 182 | 138 | YES 11/21/96 |
| 249 | 011987679 | J06A | RC28 | 26 | 16 | YES 11/21/96 |
| 249 | 011424304 | J06A | PWD5 | 101 | 88 | YES 11/21/96 |
| 250 | 001159290 | A6D3 | A6D3 | 115 | 107 | YES |
| 251 | 011545817 | GX4A | QH81 | 7 | 7 | NO |
| 251 | 011489833 | GX4A | QB38 | 4 | 0 | NO |
| 251 | 012429763 | GX4A | RX23 | 51 | 42 | NO |
| 252 | 011915694 | Q4V7 | Q4V7 | 6 | 5 | YES 11/21/96 |
| 253 | 003952548 | AG3A | KTU4 | 10 | 7 | YES |
| 253 | 010877738 | AG3A | NXT6 | 196 | 179 | NO |
| 254 | 007614903 | 2STB | JAX3 | 13 | 1 | NO |
| 256 | 001686031 | PEJA | GYQ5 | 67 | 57 | YES 11/21/96 |
| 257 | 001101746 | TPXA | JYM2 | 25 | 23 | NO |
| 257 | 010979234 | TPXA | PBV4 | 31 | 28 | NO |
| 258 | 013620246 | UCL7 | UCL7 | 30 | 16 | NO |
| 259 | 010049814 | 6FNA | K402 | 1 | 1 | NO |
| 259 | 003581630 | 6FNA | KUK4 | 1 | 1 | NO |
| 259 | 010749783 | 6FNA | NWH7 | 7 | 2 | YES 11/21/96 |
| 259 | 010533444 | 6FNA | L2X2 | 37 | 9 | NO |
| 260 | 013177764 | APBA | SY82 | 10 | 7 | NO |
| 260 | 011252995 | APBA | P1S7 | 13 | 10 | NO |

# APPENDIX C. NADEP NI QUARTERLY COMPONENT PRODUCTION REPORTS

.DATE 11:37:57 RID 529G 29 MAY 98 FANCY

.THESIS S REPORT

•WEEK (8081 THRU 8087) QUARTER (7362 THRU 8087)

| •FIC | PREL | RSHOP | PROD REQ | ICP REQ | NEG WLSTD | | CARRY IN | IND | IP | ....... RETURNS ....... RFI | F/0 | F/7 | MIS | G | SUR | MDR TAT | AVG TAT | .......MSIR QUANTITIES....... A | G | D | E | F | M |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 280A | 13 | 93501 | 0 | 0 | 55.85 | WK | | 3 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 28 | 0 | 30 | 6 | 0 | 0 | 124 | 14 |
| 280A | 13 | 93501 | 0 | 0 | 55.85 | QTR | 6 | 6 | 8 | 0 | 0 | 0 | 0 | 3 | 1 | | | | | | | | |
| 5QQA | 23 | 93305 | 5 | 9 | 165.40 | WK | | 0 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 39 | 48 | 0 | 7 | 0 | 0 | 8 | 12 |
| 5QQA | 23 | 93305 | 5 | 9 | 165.40 | QTR | 13 | 5 | 12 | 5 | 0 | 0 | 0 | 0 | 1 | | | | | | | | |
| A4XA | 23 | 93806 | 15 | 15 | 20.58 | WK | | 2 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 25 | 24 | 22 | 2 | 0 | 0 | 14 | 9 |
| A4XA | 23 | 93806 | 15 | 15 | 20.58 | QTR | 5 | 19 | 8 | 15 | 0 | 0 | 0 | 1 | 0 | | | | | | | | |
| A607 | 2 | 93504 | 2 | 2 | 29.04 | WK | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 28 | 12 | 1 | 0 | 0 | 32 | 0 |
| A607 | 2 | 93504 | 2 | 2 | 29.04 | QTR | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | | | | | | | | |
| AEG6 | 56 | 93302 | 13 | 13 | 14.17 | WK | | 0 | 17 | 0 | 0 | 0 | 0 | 0 | 0 | 21 | 26 | 45 | 12 | 0 | 0 | 14 | 30 |
| AEG6 | 56 | 93302 | 13 | 13 | 14.17 | QTR | 6 | 27 | 17 | 13 | 0 | 3 | 0 | 0 | 0 | | | | | | | | |
| ARWA | 19 | 93607 | 33 | 33 | 16.51 | WK | | 3 | 11 | 2 | 0 | 0 | 0 | 0 | 0 | 22 | 26 | 49 | 0 | 0 | 0 | 70 | 11 |
| ARWA | 19 | 93607 | 33 | 33 | 16.51 | QTR | 6 | 38 | 11 | 33 | 0 | 0 | 0 | 0 | 0 | | | | | | | | |
| B1FA | 0 | 93502 | 1 | 1 | 67.16 | WK | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 26 | 2 | 28 | 0 | 0 | 0 | 24 | 0 |
| B1FA | 0 | 93502 | 1 | 1 | 67.16 | QTR | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | | | | | | | | |
| BAR7 | 7 | 93807 | 9 | 9 | 16.60 | WK | | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 25 | 34 | 51 | 0 | 0 | 0 | 2 | 1 |
| BAR7 | 7 | 93807 | 9 | 9 | 16.60 | QTR | 0 | 9 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | | | | | | | | |
| BS5A | 1550 | 93503 | 3 | 3 | 40.13 | WK | | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 26 | 20 | 4 | 3 | 0 | 0 | 4 | 7 |
| BS5A | 1550 | 93503 | 3 | 3 | 40.13 | QTR | 3 | 10 | 1 | 2 | 7 | 1 | 0 | 0 | 2 | | | | | | | | |
| C6PA | 4 | 93808 | 6 | 6 | 10.50 | WK | | 0 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 24 | 36 | 48 | 0 | 0 | 0 | 73 | 2 |
| C6PA | 4 | 93808 | 6 | 6 | 10.50 | QTR | 6 | 5 | 1 | 6 | 0 | 0 | 0 | 0 | 4 | | | | | | | | |
| C800 | 0 | 93301 | 30 | 54 | 9.59 | WK | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 22 | 20 | 9 | 0 | 0 | 0 | 18 | 0 |
| C800 | 0 | 93301 | 30 | 54 | 9.59 | QTR | 0 | 54 | 0 | 31 | 0 | 1 | 0 | 0 | 22 | | | | | | | | |
| E1RA | 12 | 93303 | 27 | 27 | 24.47 | WK | | 0 | 17 | 0 | 0 | 0 | 0 | 6 | 0 | 39 | 34 | 26 | 28 | 0 | 0 | 2 | 21 |
| E1RA | 12 | 93303 | 27 | 27 | 24.47 | QTR | 12 | 47 | 17 | 27 | 0 | 0 | 0 | 15 | 0 | | | | | | | | |

| | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FQAA | 3 | 93208 | 13 | 18 | 79.83 | WK | | 0 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 64 | 36 | 0 | 15 | 1 | 0 | 15 | 11 |
| FQAA | 3 | 93208 | 13 | 18 | 79.83 | QTR | 6 | 22 | 12 | 15 | 0 | 1 | 0 | 0 | 0 | | | | | | | | |
| FRSA | 10 | 93301 | 34 | 34 | 77.43 | WK | | 0 | 28 | 11 | 0 | 1 | 0 | 4 | 0 | 49 | 44 | 28 | 42 | 0 | 0 | 29 | 49 |
| FRSA | 10 | 93301 | 34 | 34 | 77.43 | QTR | 56 | 48 | 28 | 38 | 0 | 2 | 0 | 33 | 3 | | | | | | | | |
| G4VA | 24 | 93303 | 18 | 67 | 24.72 | WK | | 0 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 65 | 66 | 5 | 39 | 0 | 0 | 6 | 24 |
| G4VA | 24 | 93303 | 18 | 67 | 24.72 | QTR | 19 | 22 | 14 | 18 | 0 | 0 | 0 | 9 | 0 | | | | | | | | |
| GRUA | 8 | 93209 | 8 | 11 | 114.68 | WK | | 0 | 7 | 1 | 0 | 0 | 0 | 0 | 1 | 107 | 219 | 19 | 0 | 0 | 0 | 27 | 8 |
| GRUA | 8 | 93209 | 8 | 11 | 114.68 | QTR | 9 | 2 | 7 | 2 | 0 | 0 | 0 | 0 | 2 | | | | | | | | |
| HBPA | 8 | 93807 | 31 | 149 | 23.41 | WK | | 2 | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 28 | 30 | 0 | 41 | 0 | 0 | 95 | 30 |
| HBPA | 8 | 93807 | 31 | 149 | 23.41 | QTR | 40 | 52 | 30 | 30 | 0 | 2 | 0 | 28 | 2 | | | | | | | | |
| JAJ9 | 1 | 93207 | 8 | 8 | 152.05 | WK | | 0 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 97 | 97 | 31 | 0 | 0 | 0 | 44 | 11 |
| JAJ9 | 1 | 93207 | 8 | 8 | 152.05 | QTR | 14 | 6 | 11 | 8 | 0 | 0 | 0 | 0 | 1 | | | | | | | | |
| KF86 | 31 | 93607 | 35 | 35 | 27.34 | WK | | 14 | 25 | 5 | 0 | 0 | 0 | 0 | 0 | 30 | 33 | 6 | 7 | 0 | 0 | 208 | 38 |
| KF86 | 31 | 93607 | 35 | 35 | 27.34 | QTR | 14 | 57 | 25 | 35 | 0 | 1 | 0 | 10 | 0 | | | | | | | | |
| MHBA | 20 | 93303 | 11 | 11 | 15.79 | WK | | 2 | 8 | 1 | 0 | 0 | 0 | 0 | 0 | 41 | 63 | 48 | 4 | 0 | 0 | 4 | 12 |
| MHBA | 20 | 93303 | 11 | 11 | 15.79 | QTR | 10 | 13 | 8 | 11 | 0 | 0 | 0 | 3 | 1 | | | | | | | | |
| P1Y0 | 14 | 93302 | 60 | 107 | 6.29 | WK | | 0 | 26 | 15 | 0 | 0 | 0 | 0 | 0 | 25 | 30 | 0 | 31 | 0 | 0 | 2 | 38 |
| P1Y0 | 14 | 93302 | 60 | 107 | 6.29 | QTR | 16 | 80 | 26 | 60 | 0 | 5 | 0 | 0 | 5 | | | | | | | | |
| PK86 | 9 | 93303 | 7 | 10 | 13.47 | WK | | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 39 | 39 | 37 | 14 | 0 | 0 | 5 | 2 |
| PK86 | 9 | 93303 | 7 | 10 | 13.47 | QTR | 4 | 6 | 1 | 7 | 0 | 0 | 0 | 2 | 0 | | | | | | | | |
| PWC4 | 116 | 93303 | 77 | 77 | 19.91 | WK | | 8 | 36 | 6 | 0 | 0 | 0 | 22 | 0 | 35 | 29 | 1 | 38 | 0 | 0 | 12 | 39 |
| PWC4 | 116 | 93303 | 77 | 77 | 19.91 | QTR | 21 | 117 | 36 | 61 | 0 | 1 | 0 | 34 | 6 | | | | | | | | |
| PXBA | 37 | 93305 | 26 | 26 | 15.65 | WK | | 0 | 14 | 2 | 0 | 0 | 0 | 0 | 0 | 51 | 87 | 0 | 0 | 0 | 0 | 19 | 22 |
| PXBA | 37 | 93305 | 26 | 26 | 15.65 | QTR | 37 | 42 | 14 | 26 | 0 | 0 | 0 | 0 | 39 | | | | | | | | |
| Q2H4 | 10 | 93302 | 20 | 30 | 29.25 | WK | | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 46 | 30 | 10 | 8 | 0 | 0 | 2 | 1 |
| Q2H4 | 10 | 93302 | 20 | 30 | 29.25 | QTR | 5 | 11 | 2 | 13 | 0 | 0 | 0 | 1 | 0 | | | | | | | | |
| Q4V7 | 2 | 93305 | 5 | 8 | 160.93 | WK | | 0 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 80 | 0 | 0 | 2 | 0 | 0 | 2 | 14 |
| Q4V7 | 2 | 93305 | 5 | 8 | 160.93 | QTR | 14 | 2 | 14 | 0 | 1 | 0 | 0 | 0 | 1 | | | | | | | | |

..... END REPORT .....

.DATE 29 MAY 98 10:45:32 RID 522G 29 MAY 98 FANCY

.THESIS 5 R E P O R T

•WEEK (7355 THRU 7361) QUARTER (7271 THRU 7361)

| •1ST QTR 98 | | | PROD | ICP | NEG | | CARRY | ....... | R E T | U R N | S | ....... | | | MDR | AVG | ....... | MSIR | QUANTITIES | ....... | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| •FIC | SN | RSHOP | REQ | REQ | WLSTD | | IN | IND | IP | RFI | F/0 | F/7 | MIS | G | SUR | TAT | TAT | A | G | D | E | F | M |
| 280A | 3204 | 93501 | 14 | 14 | 67.35 | WK | | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 28 | 27 | 12 | 1 | 0 | 0 | 22 | 14 |
| 280A | 3204 | 93501 | 14 | 14 | 67.35 | QTR | 7 | 16 | 9 | 12 | 2 | 0 | 0 | 0 | 0 | | | | | | | | |
| 5QQA | 3800 | 93305 | 10 | 24 | 165.40 | WK | | 0 | 13 | 0 | 0 | 0 | 0 | 0 | 0 | 39 | 15 | 0 | 12 | 0 | 0 | 9 | 13 |
| 5QQA | 3800 | 93305 | 10 | 24 | 165.40 | QTR | 5 | 14 | 13 | 1 | 0 | 0 | 0 | 5 | 0 | | | | | | | | |
| A4XA | 1460 | 93806 | 11 | 23 | 20.89 | WK | | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 25 | 27 | 15 | 1 | 0 | 0 | 11 | 8 |
| A4XA | 1460 | 93806 | 11 | 23 | 20.89 | QTR | 3 | 13 | 5 | 11 | 0 | 0 | 0 | 0 | 0 | | | | | | | | |
| A607 | 3102 | 93504 | 2 | 2 | 35.50 | WK | | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 20 | 42 | 25 | 1 | 0 | 0 | 21 | 3 |
| A607 | 3102 | 93504 | 2 | 2 | 35.50 | QTR | 2 | 4 | 0 | 2 | 3 | 0 | 0 | 1 | 0 | | | | | | | | |
| AEG6 | 5137 | 93302 | 56 | 56 | 4.58 | WK | | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 22 | 29 | 62 | 30 | 0 | 0 | 6 | 1 |
| AEG6 | 5137 | 93302 | 56 | 56 | 4.58 | QTR | 38 | 17 | 6 | 35 | 0 | 0 | 0 | 12 | 2 | | | | | | | | |
| ARWA | 3018 | 93607 | 20 | 20 | 14.60 | WK | | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 22 | 25 | 28 | 0 | 0 | 0 | 92 | 9 |
| ARWA | 3018 | 93607 | 20 | 20 | 14.60 | QTR | 6 | 23 | 6 | 20 | 0 | 1 | 0 | 0 | 2 | | | | | | | | |
| B1FA | 2472 | 93502 | 0 | 0 | 47.12 | WK | | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 25 | 24 | 86 | 0 | 0 | 0 | 65 | 3 |
| B1FA | 2472 | 93502 | 0 | 0 | 47.12 | QTR | 3 | 2 | 1 | 4 | 0 | 0 | 0 | 0 | 0 | | | | | | | | |
| BAR7 | 3605 | 93807 | 7 | 7 | 16.60 | WK | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 38 | 53 | 1 | 0 | 0 | 17 | 0 |
| BAR7 | 3605 | 93807 | 7 | 7 | 16.60 | QTR | 5 | 2 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | | | | | | | | |
| B55A | 1550 | 93503 | 5 | 5 | 18.14 | WK | | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 26 | 33 | 5 | 8 | 0 | 0 | 1 | 11 |
| B55A | 1550 | 93503 | 5 | 5 | 18.14 | QTR | 6 | 2 | 4 | 3 | 0 | 0 | 1 | 0 | 0 | | | | | | | | |
| C6PA | 3104 | 93808 | 2 | 0 | 10.50 | WK | | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 24 | 28 | 76 | 1 | 0 | 0 | 34 | 4 |
| C6PA | 3104 | 93808 | 2 | 0 | 10.50 | QTR | 15 | 15 | 6 | 12 | 10 | 1 | 0 | 0 | 1 | | | | | | | | |
| C800 | 5208 | 93301 | 35 | 0 | 8.41 | WK | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 22 | 11 | 9 | 0 | 0 | 0 | 40 | 2 |
| C800 | 5208 | 93301 | 35 | 0 | 8.41 | QTR | 0 | 59 | 0 | 38 | 1 | 0 | 0 | 0 | 20 | | | | | | | | |
| E1RA | 2454 | 93303 | 35 | 58 | 18.67 | WK | | 0 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 37 | 50 | 6 | 41 | 0 | 0 | 7 | 23 |
| E1RA | 2454 | 93303 | 35 | 58 | 18.67 | QTR | 23 | 21 | 15 | 16 | 0 | 1 | 0 | 12 | 0 | | | | | | | | |

| | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FQAA | 1464 | 93208 | 7 | 10 | 79.83 | WK | | 0 | 6 | 3 | 0 | 0 | 0 | 0 | 1 | 64 | 81 | 2 | 38 | 1 | 0 | 10 | 29 |
| FQAA | 1464 | 93208 | 7 | 10 | 79.83 | QTR | 14 | 13 | 6 | 15 | 0 | 1 | 0 | 4 | 1 | | | | | | | | |
| FRSA | 3860 | 93301 | 16 | 23 | 66.27 | WK | | 24 | 56 | 0 | 0 | 0 | 0 | 0 | 0 | 49 | 40 | 2 | 60 | 0 | 0 | 31 | 46 |
| FRSA | 3860 | 93301 | 16 | 23 | 66.27 | QTR | 30 | 74 | 56 | 33 | 0 | 1 | 0 | 14 | 0 | | | | | | | | |
| G4VA | 2410 | 93303 | 28 | 83 | 37.77 | WK | | 0 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 66 | 56 | 1 | 29 | 0 | 0 | 6 | 36 |
| G4VA | 2410 | 93303 | 28 | 83 | 37.77 | QTR | 19 | 25 | 21 | 17 | 0 | 2 | 0 | 4 | 0 | | | | | | | | |
| GRUA | 1462 | 93209 | 13 | 18 | 160.60 | WK | | 0 | 11 | 0 | 7 | 0 | 0 | 0 | 0 | 112 | 256 | 0 | 0 | 0 | 0 | 10 | 19 |
| GRUA | 1462 | 93209 | 13 | 18 | 160.60 | QTR | 14 | 7 | 11 | 3 | 7 | 0 | 0 | 0 | 0 | | | | | | | | |
| HBPA | 1412 | 93807 | 8 | 8 | 23.41 | WK | | 0 | 42 | 0 | 0 | 0 | 0 | 0 | 0 | 28 | 44 | 6 | 16 | 0 | 0 | 34 | 37 |
| HBPA | 1412 | 93807 | 8 | 8 | 23.41 | QTR | 39 | 55 | 42 | 34 | 16 | 0 | 0 | 1 | 1 | | | | | | | | |
| JAJ9 | 2848 | 93207 | 4 | 1 | 104.87 | WK | | 0 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 96 | 56 | 19 | 6 | 0 | 0 | 36 | 17 |
| JAJ9 | 2848 | 93207 | 4 | 1 | 104.87 | QTR | 5 | 18 | 14 | 9 | 0 | 0 | 0 | 0 | 0 | | | | | | | | |
| KF86 | 3728 | 93607 | 51 | 71 | 29.20 | WK | | 0 | 14 | 4 | 0 | 0 | 0 | 3 | 0 | 30 | 35 | 0 | 29 | 0 | 0 | 195 | 34 |
| KF86 | 3728 | 93607 | 51 | 71 | 29.20 | QTR | 21 | 60 | 14 | 40 | 0 | 2 | 0 | 21 | 4 | | | | | | | | |
| MHBA | 2403 | 93303 | 20 | 20 | 19.65 | WK | | 0 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 41 | 28 | 38 | 3 | 0 | 0 | 3 | 22 |
| MHBA | 2403 | 93303 | 20 | 20 | 19.65 | QTR | 8 | 27 | 11 | 20 | 0 | 1 | 0 | 2 | 1 | | | | | | | | |
| P1Y0 | 1541 | 93302 | 0 | 84 | 6.22 | WK | | 0 | 17 | 0 | 0 | 0 | 0 | 0 | 0 | 25 | 184 | 0 | 80 | 0 | 0 | 40 | 1 |
| P1Y0 | 1541 | 93302 | 0 | 84 | 6.22 | QTR | 9 | 16 | 17 | 6 | 0 | 0 | 0 | 1 | 1 | | | | | | | | |
| PK86 | 1639 | 93303 | 16 | 13 | 13.47 | WK | | 0 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 38 | 43 | 27 | 13 | 0 | 0 | 1 | 10 |
| PK86 | 1639 | 93303 | 16 | 13 | 13.47 | QTR | 5 | 13 | 4 | 14 | 0 | 0 | 0 | 0 | 0 | | | | | | | | |
| PWC4 | 1420 | 93303 | 80 | 116 | 14.48 | WK | | 0 | 25 | 1 | 0 | 0 | 0 | 0 | 0 | 37 | 51 | 0 | 8 | 0 | 0 | 57 | 36 |
| PWC4 | 1420 | 93303 | 80 | 116 | 14.48 | QTR | 35 | 43 | 25 | 30 | 0 | 2 | 0 | 20 | 1 | | | | | | | | |
| PXBA | 2438 | 93305 | 38 | 38 | 12.25 | WK | | 0 | 37 | 0 | 0 | 0 | 0 | 0 | 0 | 51 | 84 | 4 | 0 | 0 | 0 | 16 | 56 |
| PXBA | 2438 | 93305 | 38 | 38 | 12.25 | QTR | 42 | 52 | 37 | 25 | 0 | 0 | 0 | 0 | 32 | | | | | | | | |
| Q2H4 | 1424 | 93302 | 14 | 10 | 19.48 | WK | | 0 | 5 | 2 | 0 | 0 | 0 | 0 | 0 | 46 | 30 | 2 | 7 | 0 | 0 | 0 | 11 |
| Q2H4 | 1424 | 93302 | 14 | 10 | 19.48 | QTR | 6 | 16 | 5 | 14 | 2 | 0 | 0 | 1 | 0 | | | | | | | | |
| Q4V7 | 2992 | 93305 | 10 | 17 | 201.26 | WK | | 0 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 84 | 0 | 0 | 3 | 0 | 0 | 11 | 14 |
| Q4V7 | 2992 | 93305 | 10 | 17 | 201.26 | QTR | 8 | 6 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | |

..... END REPORT .....

# APPENDIX D. FORECAST DATA ANALYSIS TABLES

| FIC | Qtr 1 ICP Prelim | Qtr 1 RFI Comp | Absolute Difference | Pct Variation |
|---|---|---|---|---|
| 280A | 15 | 12 | 3 | 20% |
| 5QQA | 9 | 1 | 8 | 89% |
| A4XA | 13 | 11 | 2 | 15% |
| A607 | 11 | 2 | 9 | 82% |
| AEG6 | 48 | 35 | 13 | 27% |
| ARWA | 21 | 20 | 1 | 5% |
| B1FA | 5 | 4 | 1 | 20% |
| BAR7 | 7 | 7 | 0 | 0% |
| BS5A | 10 | 3 | 7 | 70% |
| C6PA | 20 | 12 | 8 | 40% |
| C800 | 30 | 38 | 8 | 27% |
| E1RA | 14 | 16 | 2 | 14% |
| FQAA | 16 | 15 | 1 | 6% |
| FRSA | 8 | 33 | 25 | 313% |
| G4VA | 16 | 17 | 1 | 6% |
| GRUA | 1 | 3 | 2 | 200% |
| HBPA | 50 | 34 | 16 | 32% |
| JAJ9 | 4 | 9 | 5 | 125% |
| KF86 | 23 | 40 | 17 | 74% |
| MHBA | 12 | 20 | 8 | 67% |
| P1Y0 | 15 | 6 | 9 | 60% |
| PK86 | 11 | 14 | 3 | 27% |
| PWC4 | 83 | 30 | 53 | 64% |
| PXBA | 40 | 25 | 15 | 38% |
| Q2H4 | 7 | 14 | 7 | 100% |
| Q4V7 | 2 | 0 | 2 | 100% |

| | | | | |
|---|---|---|---|---|
| Mean | 18.88 | 16.19 | 8.69 | 62% |
| Median | 13.50 | 14.00 | 7.00 | 39% |
| Range | 82.00 | 40 | 53 | 313% |

| FIC | Qtr 1 ICP Revised | Qtr 1 RFI Comp | Absolute Difference | Pct Variation |
|---|---|---|---|---|
| 280A | 14 | 12 | 2 | 14% |
| 5QQA | 24 | 1 | 23 | 96% |
| A4XA | 23 | 11 | 12 | 52% |
| A607 | 2 | 2 | 0 | 0% |
| AEG6 | 56 | 35 | 21 | 38% |
| ARWA | 20 | 20 | 0 | 0% |
| B1FA | 0 | 4 | 4 | Undefined |
| BAR7 | 7 | 7 | 0 | 0% |
| BS5A | 5 | 3 | 2 | 40% |
| C6PA | 0 | 12 | 12 | Undefined |
| C800 | 0 | 38 | 38 | Undefined |
| E1RA | 58 | 16 | 42 | 72% |
| FQAA | 10 | 15 | 5 | 50% |
| FRSA | 23 | 33 | 10 | 43% |
| G4VA | 83 | 17 | 66 | 80% |
| GRUA | 18 | 3 | 15 | 83% |
| HBPA | 8 | 34 | 26 | 325% |
| JAJ9 | 1 | 9 | 8 | 800% |
| KF86 | 71 | 40 | 31 | 44% |
| MHBA | 20 | 20 | 0 | 0% |
| P1Y0 | 84 | 6 | 78 | 93% |
| PK86 | 13 | 14 | 1 | 8% |
| PWC4 | 116 | 30 | 86 | 74% |
| PXBA | 38 | 25 | 13 | 34% |
| Q2H4 | 10 | 14 | 4 | 40% |
| Q4V7 | 17 | 0 | 17 | 100% |

| | | | | |
|---|---|---|---|---|
| Mean | 27.73 | 16.19 | 19.85 | 91% |
| Median | 17.50 | 14.00 | 12.00 | 44% |
| Range | 116.00 | 40 | 86 | 800% |

| FIC | Qtr 1 CRC Negtd | Qtr 1 RFI Comp | Absolute Difference | Pct Variation |
|---|---|---|---|---|
| 280A | 14 | 12 | 2 | 14% |
| 5QQA | 10 | 1 | 9 | 90% |
| A4XA | 11 | 11 | 0 | 0% |
| A607 | 2 | 2 | 0 | 0% |
| AEG6 | 56 | 35 | 21 | 38% |
| ARWA | 20 | 20 | 0 | 0% |
| B1FA | 0 | 4 | 4 | Undefined |
| BAR7 | 7 | 7 | 0 | 0% |
| BS5A | 5 | 3 | 2 | 40% |
| C6PA | 2 | 12 | 10 | 500% |
| C800 | 35 | 38 | 3 | 9% |
| E1RA | 35 | 16 | 19 | 54% |
| FQAA | 7 | 15 | 8 | 114% |
| FRSA | 16 | 33 | 17 | 106% |
| G4VA | 28 | 17 | 11 | 39% |
| GRUA | 13 | 3 | 10 | 77% |
| HBPA | 8 | 34 | 26 | 325% |
| JAJ9 | 4 | 9 | 5 | 125% |
| KF86 | 51 | 40 | 11 | 22% |
| MHBA | 20 | 20 | 0 | 0% |
| P1Y0 | 0 | 6 | 6 | Undefined |
| PK86 | 16 | 14 | 2 | 13% |
| PWC4 | 80 | 30 | 50 | 63% |
| PXBA | 38 | 25 | 13 | 34% |
| Q2H4 | 14 | 14 | 0 | 0% |
| Q4V7 | 10 | 0 | 10 | 100% |

| | | | | |
|---|---|---|---|---|
| Mean | 19.31 | 16.19 | 9.19 | 73% |
| Median | 13.50 | 14.00 | 7.00 | 38% |
| Range | 80.00 | 40 | 50 | 500% |

| FIC | Qtr 2 ICP Prelim | Qtr 2 RFI Comp | Absolute Difference | Pct Variation |
|---|---|---|---|---|
| 280A | 13 | 0 | 13 | 100% |
| 5QQA | 23 | 5 | 18 | 78% |
| A4XA | 23 | 15 | 8 | 35% |
| A607 | 2 | 2 | 0 | 0% |
| AEG6 | 56 | 13 | 43 | 77% |
| ARWA | 19 | 33 | 14 | 74% |
| B1FA | 0 | 1 | 1 | Undefined |
| BAR7 | 7 | 9 | 2 | 29% |
| BS5A | 15 | 2 | 13 | 87% |
| C6PA | 4 | 6 | 2 | 50% |
| C800 | 0 | 31 | 31 | Undefined |
| E1RA | 12 | 27 | 15 | 125% |
| FQAA | 3 | 15 | 12 | 400% |
| FRSA | 10 | 38 | 28 | 280% |
| G4VA | 24 | 18 | 6 | 25% |
| GRUA | 8 | 2 | 6 | 75% |
| HBPA | 8 | 30 | 22 | 275% |
| JAJ9 | 1 | 8 | 7 | 700% |
| KF86 | 31 | 35 | 4 | 13% |
| MHBA | 20 | 11 | 9 | 45% |
| P1Y0 | 14 | 60 | 46 | 329% |
| PK86 | 9 | 7 | 2 | 22% |
| PWC4 | 116 | 61 | 55 | 47% |
| PXBA | 37 | 26 | 11 | 30% |
| Q2H4 | 10 | 13 | 3 | 30% |
| Q4V7 | 2 | 0 | 2 | 100% |

| | | | | |
|---|---|---|---|---|
| Mean | 17.96 | 18.00 | 14.35 | 126% |
| Median | 11.00 | 13.00 | 10.00 | 74% |
| Range | 116.00 | 61 | 55 | 700% |

| FIC | Qtr 2<br>ICP Revised | Qtr 2<br>RFI Comp | Absolute<br>Difference | Pct Variation |
|---|---|---|---|---|
| 280A | 0 | 0 | 0 | Undefined |
| 5QQA | 9 | 5 | 4 | 44% |
| A4XA | 15 | 15 | 0 | 0% |
| A607 | 2 | 2 | 0 | 0% |
| AEG6 | 13 | 13 | 0 | 0% |
| ARWA | 33 | 33 | 0 | 0% |
| B1FA | 1 | 1 | 0 | 0% |
| BAR7 | 9 | 9 | 0 | 0% |
| BS5A | 3 | 2 | 1 | 33% |
| C6PA | 6 | 6 | 0 | 0% |
| C800 | 54 | 31 | 23 | 43% |
| E1RA | 27 | 27 | 0 | 0% |
| FQAA | 18 | 15 | 3 | 17% |
| FRSA | 34 | 38 | 4 | 12% |
| G4VA | 67 | 18 | 49 | 73% |
| GRUA | 11 | 2 | 9 | 82% |
| HBPA | 149 | 30 | 119 | 80% |
| JAJ9 | 8 | 8 | 0 | 0% |
| KF86 | 35 | 35 | 0 | 0% |
| MHBA | 11 | 11 | 0 | 0% |
| P1Y0 | 107 | 60 | 47 | 44% |
| PK86 | 10 | 7 | 3 | 30% |
| PWC4 | 77 | 61 | 16 | 21% |
| PXBA | 26 | 26 | 0 | 0% |
| Q2H4 | 30 | 13 | 17 | 57% |
| Q4V7 | 8 | 0 | 8 | 100% |

| | | | | |
|---|---|---|---|---|
| Mean | 29.35 | 18.00 | 11.65 | 25% |
| Median | 14.00 | 13.00 | 0.50 | 12% |
| Range | 149.00 | 61 | 119 | 800% |

| FIC | Qtr 2 CRC Negtd | Qtr 2 RFI Comp | Absolute Difference | Pct Variation |
|---|---|---|---|---|
| 280A | 0 | 0 | 0 | Undefined |
| 5QQA | 5 | 5 | 0 | 0% |
| A4XA | 15 | 15 | 0 | 0% |
| A607 | 2 | 2 | 0 | 0% |
| AEG6 | 13 | 13 | 0 | 0% |
| ARWA | 33 | 33 | 0 | 0% |
| B1FA | 1 | 1 | 0 | 0% |
| BAR7 | 9 | 9 | 0 | 0% |
| BS5A | 3 | 2 | 1 | 33% |
| C6PA | 6 | 6 | 0 | 0% |
| C800 | 30 | 31 | 1 | 3% |
| E1RA | 27 | 27 | 0 | 0% |
| FQAA | 13 | 15 | 2 | 15% |
| FRSA | 34 | 38 | 4 | 12% |
| G4VA | 18 | 18 | 0 | 0% |
| GRUA | 8 | 2 | 6 | 75% |
| HBPA | 31 | 30 | 1 | 3% |
| JAJ9 | 8 | 8 | 0 | 0% |
| KF86 | 35 | 35 | 0 | 0% |
| MHBA | 11 | 11 | 0 | 0% |
| P1Y0 | 60 | 60 | 0 | 0% |
| PK86 | 7 | 7 | 0 | 0% |
| PWC4 | 77 | 61 | 16 | 21% |
| PXBA | 26 | 26 | 0 | 0% |
| Q2H4 | 20 | 13 | 7 | 35% |
| Q4V7 | 5 | 0 | 5 | 100% |

| | | | | |
|---|---|---|---|---|
| Mean | 19.12 | 18.00 | 1.65 | 12% |
| Median | 13.00 | 13.00 | 0.00 | 0% |
| Range | 77.00 | 61 | 4 | 100% |

# APPENDIX E. BOM DEPTH ANALYSIS TABLE

| Component Inductions | BOM Depth Accuracy | Weighted BOM Acc |
|---|---|---|
| 42 | 0.792 | 0.010 |
| 61 | 0.726 | 0.013 |
| 62 | 0.989 | 0.019 |
| 65 | 0.995 | 0.020 |
| 215 | 0.976 | 0.063 |
| 95 | 0.973 | 0.028 |
| 45 | 0.873 | 0.012 |
| 113 | 0.951 | 0.032 |
| 31 | 0.763 | 0.007 |
| 219 | 0.998 | 0.066 |
| 191 | 1.000 | 0.058 |
| 87 | 0.892 | 0.023 |
| 81 | 0.825 | 0.020 |
| 216 | 0.950 | 0.062 |
| 52 | 0.748 | 0.012 |
| 21 | 0.759 | 0.005 |
| 390 | 0.894 | 0.105 |
| 48 | 0.945 | 0.014 |
| 135 | 0.972 | 0.040 |
| 116 | 0.937 | 0.033 |
| 211 | 0.811 | 0.052 |
| 106 | 0.984 | 0.031 |
| 274 | 0.966 | 0.080 |
| 317 | 1.000 | 0.096 |
| 112 | 0.987 | 0.033 |
| 6 | 0.000 | 0.000 |
| 3311 | Totals | 0.934 |

# APPENDIX F. G CONDITION STATUS REPORT

| O | M C | FSC | NIIN | SM | FIC | IIC | SHOP | L S | REPAIR SCHEDULE DOCUMENT NUMBER | AWC DATE | AWP DATE | G STATUS | AWI DATE | SER NO. | LINK NO. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7R | E | 8115 | 011625000 | GF | HBRA | | 93807 | L | NWRN32731774650001 | 68028 | 68042 | 4WP | O | | U238308 |
| 7R | E | 6115 | 011625000 | GF | H6RA | | 53807 | L | NWRN32732300350001 | 88028 | 88042 | 4WP | O | | U254130 |
| 7R | H | 5115 | 013036743 | GF | HBPA | | 93807 | L | NWRN32729655240001 | 98028 | 98042 | AWP | O | | U243597 |
| 7R | E | 6115 | 011825000 | GF | HBPA | | 63807 | L | NWRN32732077300001 | 68028 | 68042 | AWP | O | | U242113 |
| 7R | E | 6115 | 011625000 | GF | H6R4 | | 93807 | L | NWRN32731774840001 | 68026 | 88042 | AWP | O | | U238301 |
| 7R | E | 8115 | 011825000 | GF | HBRA | | 63807 | L | NWRN32714768460005 | 67288 | 67301 | 4WP | O | | T762451 |
| 7R | E | 8115 | 011625000 | GF | HBR4 | | 83807 | 8 | NWRH32718012370001 | 87231 | 87287 | AWP | O | | T864738 |
| 7R | E | 6115 | 011625000 | GF | HBPA | | 93807 | 8 | NWRN32714768460003 | 97231 | 97345 | AWP | O | | T792439 |
| 7R | E | 6115 | 011825000 | GF | H6RA | | 53807 | L | NWRH32714788460004 | 67255 | 67287 | AWP | O | | T762445 |
| 7R | E | 6115 | 011542587 | GF | HBRA | | 63807 | L | NWRN32714286210001 | 67255 | 67279 | AWP | O | | T784216 |
| 7R | E | 5115 | 011625000 | GF | H6R4 | | 93807 | L | NWRN32735185700001 | 88063 | 88099 | AWP | O | | U317753 |
| 7R | E | 8115 | 011625000 | GF | H8R4 | | 53807 | L | NWRN32800724390001 | 88083 | 68103 | AWP | O | | U341818 |

TOTAL AWC FOR HBPA: 0 TOTAL AWI FOR H6RA: 1 TOTAL AWP FOR HBPA: 41 TOTAL COMPONENTS FOR H6PA: 42

| O | M C | FSC | NIIN | SM | FIC | IIC | SHOP | L S | REPAIR SCHEDULE DOCUMENT NUMBER | AWC DATE | AWP DATE | G STATUS | AWI DATE | SER NO. | LINK NO. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7R | H | 6115 | 011726527 | GF | HB0B | | 63807 | L | NWSN32506238990003 | 98016 | 98071 | AWP | O | | U000637 |
| 7R | H | 6115 | 011726527 | GF | H606 | | 53807 | L | NWRN32718817500001 | 67245 | 67279 | 4WP | O | | T871450 |
| 7R | H | 6115 | 011726527 | GF | HB0B | | 93807 | L | NWRN32719425290001 | 97245 | 97279 | AWP | O | | T887434 |

TOTAL AWC FOR HBOB: 0 TOTAL AWI FOR H8OB: 0 TOTAL AWP FOR HBQB: 3 TOTAL COMRONENTS FOR HBOB: 3

| O | M C | FSC | NIIN | SM | FIC | IIC | SHOP | L S | REPAIR SCHEDULE DOCUMENT NUMBER | AWC DATE | AWP DATE | G STATUS | AWI DATE | SER NO. | LINK NO. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7R | H | 5885 | 011547564 | GF | HC8A | | 53503 | L | NWSN32623632940005 | 67082 | 67107 | AWP | O | | 7450832 |

TOTAL AWC FOR HC8A: 0 TOTAL AWI FOR HC6A: 0 TOTAL AWP FOR HC6A: 1 TOTAL COMRONENTS FOR HC8A: 1

| O | M C | FSC | NIIN | SM | FIC | IIC | SHOP | L S | REPAIR SCHEDULE DOCUMENT NUMBER | AWC DATE | AWP DATE | G STATUS | AWI DATE | SER NO. | LINK NO. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7R | E | 2640 | 011520553 | GF | HCHA | 71F7 | 63105 | L | NWRN32627562550002 | 97026 | 67042 | AWP | O | | T313188 |
| 7R | E | 2840 | 011520853 | GF | HCH4 | 71F7 | 83105 | L | NWRN32627562650001 | 67028 | 67042 | AWP | O | | T313152 |
| 7R | E | 2240 | 011520853 | GF | HCHA | 71F7 | 93105 | L | NWRN32628266540001 | 96323 | 97086 | AWP | O | | T326535 |
| 7R | E | 2840 | 011520854 | GF | HCHA | | 53105 | L | NWRN32520607190002 | 85289 | 65282 | AWP | O | | R637651 |
| 7R | E | 2840 | 011520853 | GF | HCHA | 71F7 | 63105 | L | NWRH32627562650003 | 67154 | 97188 | AWP | O | | T313226 |
| 79 | E | 2840 | 011520653 | GF | HCH4 | 71F7 | 93105 | B | NWRH32619831690002 | 86266 | 86277 | AWP | O | | T206389 |
| 79 | E | 2840 | 011520853 | GF | HCH4 | 71F7 | 83105 | B | NWRN32617016820004 | 66268 | 96277 | 4WP | O | | 7167754 |
| 7R | E | 2840 | 011520853 | GF | HCHA | 71F7 | 93105 | B | NWRN32619128470001 | 96269 | 96277 | AWP | O | | T209264 |
| 7R | E | 2840 | 011520853 | GF | HCHA | 71F7 | 53105 | B | NWRN32621640660002 | 66278 | 66320 | AWP | O | | T215226 |
| 7R | E | 2840 | 011520853 | GF | HCH4 | 71F7 | 93105 | B | NWRN32523344600001 | 66266 | 66277 | AWP | O | | T236742 |
| 7R | E | 2840 | 011520853 | GF | HCHA | 71F7 | 93105 | B | NWRN32617019820002 | 96286 | 66277 | AWP | O | | T136316 |
| 7R | E | 2840 | 011520853 | GF | HCHA | 71F7 | 83105 | 6 | NWRN32621840660001 | 66274 | 66305 | AWP | O | | T215189 |
| 7R | E | 2840 | 011520853 | GF | HCHA | 71F7 | 93105 | L | NWRN32617015820003 | 97332 | 97335 | AWP | O | | T139325 |
| 7R | E | 2840 | 011520853 | GF | HCHA | 71F7 | 63105 | B | NWRN32516128470002 | 66268 | 96277 | AWP | O | | T176368 |
| 7R | E | 2840 | 011520853 | GF | HCHA | 71F7 | 63105 | B | NWRN32625452710001 | 96274 | 66305 | AWP | O | | T275130 |
| 7R | E | 2840 | 011520854 | GF | HCHA | | 83105 | L | NWRN32609269610004 | 97224 | 97234 | AWP | O | | T726744 |
| 7R | E | 2840 | 011520853 | GF | HCH4 | 71F7 | 63105 | 6 | NWRN32616831890003 | 96269 | 66277 | AWP | O | | T212567 |
| 7R | E | 2840 | 011520853 | GF | HCHA | 71F7 | 93105 | B | NWRN32518224660001 | 96269 | 96277 | AWP | O | | T167976 |
| 7R | E | 2840 | 011520853 | GF | HCH4 | 71F7 | 93105 | L | NWRH32617016820005 | 67332 | 67335 | AWP | O | | T136337 |

TOTAL AWC FOR HCHA: 0 TOTAL AWI FOR HCHA: 0 TOTAL AWP FOR HCHA: 18 TOTAL COMPONENTS FOR HCHA: 16

| O | M C | FSC | NIIN | SM | FIC | IIC | SHOP | L S | REPAIR SCHEDULE DOCUMENT NUMBER | AWC DATE | AWP DATE | G STATUS | AWI DATE | SER NO. | LINK NO. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7R | H | 5621 | 012836732 | FP | HDHA | SH67 | 93504 | L | NWSN32701526250018 | 98023 | 98044 | AWP | O | | T841380 |
| 7R | H | 5621 | 012636742 | FR | HDHA | SH67 | 63504 | L | NWSN32701526250018 | 97224 | 87248 | AWP | O | | T824159 |

TOTAL AWC FOR HDHA: 0 TOTAL AWI FOR HDHA: 0 TOTAL AWP FOR HDHA: 2 TOTAL COMPONENTS FOR HDHA: 2

| O | M C | FSC | NIIN | SM | FIC | IIC | SHOP | L S | REPAIR SCHEDULE DOCUMENT NUMBER | AWC DATE | AWP DATE | G STATUS | AWI DATE | SER NO. | LINK NO. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7R | E | 6610 | 011428323 | DA | HE3A | | 93606 | L | NWRN32720436340001 | 97239 | 97274 | AWP | O | | T920158 |
| 7R | E | 5610 | 011426323 | DA | HE3A | | 93606 | L | NWJH32120236340001 | 67239 | 67260 | AWP | O | | T613265 |

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| O | M C | FSC | NIIN | SM | FIC | IIC | SHOP | L S | REPAIR SCHEDULE DOCUMENT NUMBER | AWC DATE | AWP DATE | G STATUS | AWI DATE | SER NO. | LINK NO. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7R | E | 8610 | 011428323 | DA | HE34 | | 83606 | L | NWRN32628165260003 | 86319 | 87125 | 4WP | | | 7322623 |
| 7R | E | 6610 | 011428323 | DA | HE3A | | 93606 | L | NWRN32704758840001 | 97090 | 97107 | AWP | O | | T548833 |
| 7R | E | 6610 | 011428323 | DA | HE3A | | 83606 | L | NWRN32620433820001 | 66316 | 67125 | AWP | | | T190620 |
| 7R | E | 8810 | 011428323 | OA | HE3A | | 63608 | L | NWRN32433451660001 | 66066 | 66065 | AWP | O | | R876712 |
| 7R | E | 6610 | 001679800 | OA | HE3A | | 63806 | L | NWRN32714768500008 | 67203 | 67213 | AWP | O | | 7762697 |
| 7R | E | 5810 | 011428323 | 04 | HE3A | | 93608 | L | NWRN32533837830001 | 86080 | 86087 | 4WP | O | | R848118 |
| 7R | E | 6610 | 011428323 | DA | HE34 | | 93606 | L | NWRN32600946190004 | 96080 | 96081 | AWP | O | | R882435 |
| 7R | E | 6810 | 011428323 | DA | HE3A | | 63506 | L | NWRN32501648360002 | 66184 | 96176 | AWP | O | | R895210 |
| 7R | E | 6810 | 011428323 | OA | HE34 | | 63608 | L | NWRN32612202270002 | 68165 | 96176 | AWP | O | | T068665 |
| 7R | E | 6810 | 011428323 | OA | HE34 | | 83608 | L | NWRN32616919270003 | 66206 | 66233 | AWP | O | | T135680 |
| 7R | E | 6810 | 011428323 | OA | HE34 | | 53606 | L | NWRN32517622540001 | 58208 | 96241 | AWP | O | | 7146806 |
| 7R | E | 6610 | 011428323 | DA | HE3A | | 93606 | L | NWRN32605753290002 | 96149 | 96154 | AWP | O | | R965455 |
| 7R | E | 6610 | 011428323 | DA | HE34 | | 63606 | L | NWRH32612202270003 | 66187 | 96233 | AWP | O | | T068668 |

TOTAL AWC FOR HE3A: 0 TOTAL AWI FOR HE3A: 0 TOTAL AWP FOR HE3A: 15 TOTAL COMPONENTS FOR HE3A: 15

| O | M C | FSC | NIIN | SM | FIC | IIC | SHOP | L S | REPAIR SCHEDULE DOCUMENT NUMBER | AWC DATE | AWP DATE | G STATUS | AWI DATE | SER NO. | LINK NO. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7R | H | 1650 | 004831859 | FA | HEX6 | HEX6 | 93806 | L | NWSN32701323140023 | 97134 | 97157 | AWP | O | | T709738 |
| 7R | H | 1850 | 004831859 | FA | HEX6 | HEX5 | 63606 | L | NWSH32701323140034 | 67203 | 66072 | AWP | O | | T967044 |

TOTAL AWC FOR HEX6: 0 TOTAL AWI FOR HEX8: 0 TOTAL AWP FOR HEX8: 2 TOTAL COMPONENTS FOR HEX6: 2

| O | M C | FSC | NIIN | SM | FIC | IIC | SHOP | L S | REPAIR SCHEDULE DOCUMENT NUMBER | AWC DATE | AWP DATE | G STATUS | AWI DATE | SER NO. | LINK NO. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7R | E | 1650 | 013513373 | GF | HF2A | T302 | 93302 | L | NWRN32806762650001 | 98105 | 0 | AWC | O | | U514791 |
| 7R | E | 1650 | 013513373 | GF | HF2A | T302 | 93302 | L | NWRN32800873024003 | 68085 | 68068 | AWP | O | | U378893 |
| 7R | E | 1650 | 013513373 | GF | HF2A | 7302 | 93302 | 6 | NWRN32633810530001 | 67150 | 97167 | AWP | O | | T422142 |
| 7R | E | 1850 | 013513373 | GF | HF2A | T302 | 63302 | L | NWRN32706474510003 | 67231 | 67274 | AWP | O | | T583557 |
| 7R | E | 1650 | 013513373 | GF | HF24 | T302 | 83302 | L | NWRN32609265620003 | 87094 | 97088 | AWP | O | | 7408280 |
| 7R | E | 1650 | 013513373 | GF | HF2A | T302 | 93302 | L | NWRN32707506630001 | 97209 | 97217 | 4WP | O | | T621340 |
| 7R | E | 1650 | 013513373 | GF | HF2A | T302 | 63302 | L | NWRH32805450640001 | 68063 | | AWC | | | U471685 |
| 7R | E | 1850 | 013513373 | GF | HF2A | T302 | 63302 | L | NWRH32800873024012 | 68100 | 66103 | AWP | O | | U386524 |
| 7R | E | 1650 | 013513373 | GF | HF2A | T302 | 63302 | L | NWRN32800873024007 | 68103 | | AWC | | | U369436 |
| 7R | E | 1850 | 013513373 | GF | HF2A | T302 | 83302 | L | NWRN32804643390007 | 88098 | 68088 | AWP | O | | U450185 |
| 7R | E | 1650 | 011708388 | GF | HF2A | | 93302 | L | NWRN32517019630002 | 97312 | 97312 | AWP | O | | T648445 |
| 7R | E | 1650 | 013513373 | GF | HF2A | T302 | 63302 | L | NWRN32704255180001 | 67276 | 67310 | AWP | O | | T542901 |
| 7R | E | 1650 | 013513373 | GF | HF2A | 7302 | 83302 | L | NWRN32508867660001 | 96164 | 66241 | AWP | O | | T004677 |
| 7R | E | 1650 | 013513373 | GF | HF2A | T302 | 93302 | L | NWRN32805348790001 | 98105 | 0 | AWC | O | | U489490 |
| 7R | E | 1850 | 011708388 | GF | HF24 | | 93302 | L | NWRN32707506600001 | 97238 | 67253 | 4WP | O | | T621365 |
| 7R | E | 1650 | 013513373 | GF | HF2A | T302 | 93302 | L | NWRN32804643390001 | 98085 | 98098 | AWP | O | | U450155 |
| 7R | E | 1650 | 011708388 | GF | HF2A | | 63302 | L | NWRN32517016830005 | 68098 | 68103 | AWI-MS | 96103 | | U345290 |
| 7R | E | 1650 | 013513373 | GF | HF2A | T302 | 63302 | L | NWRN32816325500003 | 97234 | 97274 | AWP | O | | T728966 |
| 7R | E | 1650 | 013513373 | GF | HF2A | T302 | 93302 | L | NWRN32800520440001 | 68051 | 68075 | AWP | O | | U332210 |
| 7R | E | 1650 | 013513373 | GF | HF24 | T302 | 83302 | L | NWRN32728453110001 | 98034 | 68056 | AWP | O | | U174788 |
| 7R | E | 1650 | 013513373 | GF | HF2A | T302 | 93302 | L | NWRN32801127070001 | 98051 | 98076 | AWP | O | | U346709 |
| 7P | E | 1850 | 013513373 | GF | HF2A | T302 | 63302 | L | NWRN32713662300001 | 98034 | 88056 | AWP | O | | U222764 |
| 7R | E | 1850 | 013513373 | GF | HF2A | 7302 | 83302 | L | NWRN32704758860004 | 98034 | 98056 | AWP | O | | U253768 |
| 7R | E | 1850 | 013513373 | GF | HF2A | T302 | 83302 | L | NWRN32728453110C02 | 98034 | 66056 | AWP | O | | U174763 |
| 7R | E | 1550 | 011708388 | GF | HF2A | | 93302 | L | NWRN32706877480001 | 98051 | 68075 | AWP | O | | U253776 |
| 7R | E | 1650 | 013513373 | GF | HF2A | T302 | 93302 | L | NWRN32713561310001 | 98006 | 98009 | AWP | O | | T760495 |

TOTAL AWC FOR HF2A: 4 TOTAL AWI FOR HF2A: 1 TOTAL AWP FOR HF2A: 21 TOTAL COMPONENTS FOR HF2A: 26

| O | M C | FSC | NIIN | SM | FIC | IIC | SHOP | L S | REPAIR SCHEDULE DOCUMENT NUMBER | AWC DATE | AWP DATE | G STATUS | AWI DATE | SER NO. | LINK NO. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7R | H | 5885 | 001687621 | FR | HF44 | | 83501 | L | NWRH32718315060001 | 68051 | 66066 | AWI-NR | 68068 | | T668231 |
| 7R | H | 5835 | 001687921 | FP | HF44 | | 93501 | L | NWRN32715372770001 | 97224 | 97240 | AWP | O | | T813341 |

# APPENDIX G. G CONDITION REQUISITION DATA

| FIC | G Cond Assests | Reqn Julian Date | Age of Reqn (Days) |
|---|---|---|---|
| 280A | 1 | **7281** | **219** |
| 5QQA | 6 | **7232** | **268** |
| | | 7022 | 478 |
| | | 7270 | 230 |
| | | 7122 | 378 |
| | | 7232 | 268 |
| | | 7121 | 379 |
| | | 7121 | 379 |
| | | **6284** | **582** |
| A4XA | 1 | **8119** | **16** |
| A607 | 1 | **7252** | **248** |
| AEG6 | 3 | **7182** | **318** |
| | | **7021** | **479** |
| | | 7021 | 479 |
| | | 7302 | 198 |
| ARWA | 0 | | |
| B1FA | 0 | | |
| BAR7 | 0 | | |
| BS5A | 1 | **7163** | **337** |
| | | **7170** | **330** |
| C6PA | 0 | | |
| C800 | 0 | | |
| E1RA | 20 | 6268 | 598 |
| | | **6250** | **616** |
| | | 6255 | 611 |
| | | 7136 | 364 |
| | | 7072 | 428 |
| | | 8051 | 84 |
| | | 7073 | 427 |
| | | **7069** | **431** |
| | | 7177 | 323 |
| | | 7074 | 426 |
| | | **7074** | **426** |
| | | 7268 | 232 |
| | | 7268 | 232 |

| | | | |
|---|---|---|---|
| | | 7287 | 213 |
| | | 7287 | 213 |
| | | 7309 | 191 |
| | | 7329 | 171 |
| | | 8012 | 123 |
| | | 8054 | 81 |
| | | 8054 | 81 |
| | | 8049 | 86 |
| | | 8049 | 86 |
| | | 8049 | 86 |
| | | 8051 | 84 |
| | | 8057 | 78 |
| | | 8054 | 81 |
| | | 8054 | 81 |
| | | **8079** | **56** |
| FQAA | 7 | **7254** | **246** |
| | | **6144** | **722** |
| | | **7271** | **229** |
| | | 7271 | 229 |
| | | **7203** | **297** |
| | | **7203** | **297** |
| | | 7203 | 297 |
| | | 7203 | 297 |
| | | 8119 | 16 |
| | | 8117 | 18 |
| | | 8117 | 18 |
| | | **8083** | **52** |
| | | 8126 | 9 |
| | | 8057 | 78 |
| | | 8120 | 15 |
| | | 8117 | 18 |
| | | 8120 | 15 |
| | | 8120 | 15 |
| FRSA | 40 | 7271 | 229 |
| | | 7271 | 229 |
| | | 7271 | 229 |
| | | **7321** | **179** |
| | | 7300 | 200 |
| | | **7261** | **239** |
| | | **7261** | **239** |

| | | | |
|---|---|---|---|
| | | 7349 | 151 |
| | | 7301 | 199 |
| | | **7301** | **199** |
| | | **7310** | **190** |
| | | **7316** | **184** |
| | | 7325 | 175 |
| | | 7325 | 175 |
| | | 7325 | 175 |
| | | 7345 | 155 |
| | | **7339** | **161** |
| | | 7339 | 161 |
| | | **7307** | **193** |
| | | 7307 | 193 |
| | | 7321 | 179 |
| | | 8023 | 112 |
| | | 7343 | 157 |
| | | 7352 | 148 |
| | | 7316 | 184 |
| | | **8021** | **114** |
| | | 8037 | 98 |
| | | 8021 | 114 |
| | | 8021 | 114 |
| | | 8027 | 108 |
| | | 8062 | 73 |
| | | 8021 | 114 |
| | | 8062 | 73 |
| | | **8042** | **93** |
| | | **8026** | **109** |
| | | 8026 | 109 |
| | | 8026 | 109 |
| | | 8026 | 109 |
| | | 8030 | 105 |
| | | 8040 | 95 |
| | | 8030 | 105 |
| | | 8021 | 114 |
| | | 8030 | 105 |
| | | 8030 | 105 |
| | | 8027 | 108 |
| | | 8027 | 108 |
| | | 8027 | 108 |

| | | | |
|---|---|---|---|
| | | 8030 | 105 |
| | | 8030 | 105 |
| | | 8048 | 87 |
| | | 8028 | 107 |
| | | 8062 | 73 |
| | | 8034 | 101 |
| | | **8035** | **100** |
| | | 8040 | 95 |
| | | 8041 | 94 |
| | | 8041 | 94 |
| | | 8041 | 94 |
| | | 8069 | 66 |
| | | 8041 | 94 |
| | | 8062 | 73 |
| | | 8079 | 56 |
| | | 8078 | 57 |
| | | 8079 | 56 |
| | | 8075 | 60 |
| | | 8073 | 62 |
| | | 8073 | 62 |
| | | 8077 | 58 |
| | | 8075 | 60 |
| | | 8050 | 85 |
| | | 8050 | 85 |
| | | 8050 | 85 |
| | | 8050 | 85 |
| | | 8050 | 85 |
| | | 8063 | 72 |
| | | 8075 | 60 |
| | | 8056 | 79 |
| | | 8056 | 79 |
| | | 8056 | 79 |
| | | 8078 | 57 |
| | | 8062 | 73 |
| | | **8077** | **58** |
| | | 8077 | 58 |
| | | 8055 | 80 |
| | | 8062 | 73 |
| | | 8062 | 73 |
| | | 8064 | 71 |
| | | 8064 | 71 |

| | | | |
|---|---|---|---|
| | | 8078 | 57 |
| | | 8078 | 57 |
| | | **8079** | **56** |
| | | 8078 | 57 |
| | | 8078 | 57 |
| | | 8076 | 59 |
| | | 8079 | 56 |
| | | 8075 | 60 |
| | | 8082 | 53 |
| | | 8075 | 60 |
| | | 8062 | 73 |
| | | 8044 | 91 |
| | | 8044 | 91 |
| | | 8076 | 59 |
| | | 8076 | 59 |
| | | 8076 | 59 |
| | | 8079 | 56 |
| | | 8076 | 59 |
| | | 8043 | 92 |
| | | 8043 | 92 |
| | | 8064 | 71 |
| | | 8064 | 71 |
| | | 8064 | 71 |
| | | 8064 | 71 |
| | | 8064 | 71 |
| | | 8090 | 45 |
| | | 8090 | 45 |
| | | 8079 | 56 |
| | | 8079 | 56 |
| G4VA | 1 | **7210** | **290** |
| | | **7210** | **290** |
| GRUA | 0 | | |
| HBPA | 41 | 8042 | 93 |
| | | 8042 | 93 |
| | | 8055 | 80 |
| | | 8042 | 93 |
| | | 8042 | 93 |
| | | 8042 | 93 |
| | | 8055 | 80 |
| | | 8056 | 79 |

| | | | |
|---|---|---|---|
| | | 8042 | 93 |
| | | 8049 | 86 |
| | | 8057 | 78 |
| | | 8055 | 80 |
| | | 8045 | 90 |
| | | 8052 | 83 |
| | | 8052 | 83 |
| | | 8052 | 83 |
| | | 8046 | 89 |
| | | 8052 | 83 |
| | | 8061 | 74 |
| | | **7301** | **199** |
| | | 7287 | 213 |
| | | **7287** | **213** |
| | | 7293 | 207 |
| | | 7291 | 209 |
| | | 8045 | 90 |
| | | 8046 | 89 |
| | | 8045 | 90 |
| | | 8051 | 84 |
| | | 7287 | 213 |
| | | 7287 | 213 |
| | | 7290 | 210 |
| | | **7288** | **212** |
| | | 7290 | 210 |
| | | **7087** | **413** |
| | | 7279 | 221 |
| | | 7291 | 209 |
| | | 7287 | 213 |
| | | 7255 | 245 |
| | | 8099 | 36 |
| | | **8103** | **32** |
| | | 8105 | 30 |
| | | 8089 | 46 |
| | | 8089 | 46 |
| | | 8106 | 29 |
| JAJ9 | 0 | | |
| KF86 | 10 | **7121** | **379** |
| | | 7121 | 379 |
| | | 7294 | 206 |

| | | | |
|---|---|---|---|
| | | **7288** | **212** |
| | | **7288** | **212** |
| | | **7294** | **206** |
| | | **7288** | **212** |
| | | **7344** | **156** |
| | | 8009 | 126 |
| | | **8033** | **102** |
| | | 8042 | 93 |
| | | **8033** | **102** |
| | | 8058 | 77 |
| | | **8058** | **77** |
| | | **8034** | **101** |
| | | 8048 | 87 |
| | | 8048 | 87 |
| | | 8099 | 36 |
| | | 8099 | 36 |
| MHBA | 4 | **7189** | **311** |
| | | 7294 | 206 |
| | | 7329 | 171 |
| | | 7335 | 165 |
| P1Y0 | 11 | 7233 | 267 |
| | | **7148** | **352** |
| | | 7154 | 346 |
| | | 7239 | 261 |
| | | 8049 | 86 |
| | | 8092 | 43 |
| | | 8092 | 43 |
| | | 8092 | 43 |
| | | 8092 | 43 |
| | | 8092 | 43 |
| | | 8092 | 43 |
| PK86 | 13 | **6320** | **546** |
| | | 6320 | 546 |
| | | 6320 | 546 |
| | | 6320 | 546 |
| | | 6320 | 546 |
| | | 6320 | 546 |
| | | **7083** | **417** |
| | | 7085 | 415 |
| | | 7104 | 396 |

| | | | |
|---|---|---|---|
| | | 7100 | 400 |
| | | 7160 | 340 |
| | | **7290** | **210** |
| | | 7290 | 210 |
| | | **7290** | **210** |
| | | **7324** | **176** |
| | | **7211** | **289** |
| | | 6320 | 546 |
| PWC4 | 54 | **8016** | **119** |
| | | 8033 | 102 |
| | | 8033 | 102 |
| | | 8016 | 119 |
| | | 8035 | 100 |
| | | 8036 | 99 |
| | | 8036 | 99 |
| | | 8037 | 98 |
| | | 8015 | 120 |
| | | 8033 | 102 |
| | | 8013 | 122 |
| | | 8034 | 101 |
| | | **7296** | **204** |
| | | 7357 | 143 |
| | | 8051 | 84 |
| | | 8054 | 81 |
| | | 8015 | 120 |
| | | 8051 | 84 |
| | | 7357 | 143 |
| | | 8054 | 81 |
| | | 8054 | 81 |
| | | 8068 | 67 |
| | | 8068 | 67 |
| | | 8049 | 86 |
| | | 8049 | 86 |
| | | 8049 | 86 |
| | | 8036 | 99 |
| | | 8049 | 86 |
| | | 8054 | 81 |
| | | 8015 | 120 |
| | | 8044 | 91 |
| | | 8069 | 66 |

| | | | |
|---|---|---|---|
| | | 8069 | 66 |
| | | **8061** | **74** |
| | | 8061 | 74 |
| | | 8061 | 74 |
| | | 8063 | 72 |
| | | 8063 | 72 |
| | | 8063 | 72 |
| | | 8073 | 62 |
| | | 8069 | 66 |
| | | 8069 | 66 |
| | | 8069 | 66 |
| | | 8070 | 65 |
| | | 8070 | 65 |
| | | 8070 | 65 |
| | | **8073** | **62** |
| | | 8073 | 62 |
| | | 8073 | 62 |
| | | 8073 | 62 |
| | | 8073 | 62 |
| | | 8073 | 62 |
| | | 8073 | 62 |
| | | 8073 | 62 |
| | | 8073 | 62 |
| | | 8073 | 62 |
| | | 8069 | 66 |
| | | 8069 | 66 |
| | | 8071 | 64 |
| | | 8071 | 64 |
| | | 8071 | 64 |
| | | 8090 | 45 |
| | | 8090 | 45 |
| | | 8070 | 65 |
| | | 8070 | 65 |
| | | 8071 | 64 |
| | | 8071 | 64 |
| | | 8071 | 64 |
| | | 8071 | 64 |
| | | 8070 | 65 |
| | | 8070 | 65 |
| | | 8070 | 65 |
| | | 8083 | 52 |

| | | | |
|---|---|---|---|
| | | 8083 | 52 |
| | | 8083 | 52 |
| | | 8075 | 60 |
| | | 8075 | 60 |
| | | 8075 | 60 |
| | | 8075 | 60 |
| | | 8076 | 59 |
| | | 8076 | 59 |
| | | 8076 | 59 |
| | | 8076 | 59 |
| | | 8083 | 52 |
| | | 8083 | 52 |
| | | 8083 | 52 |
| | | 8083 | 52 |
| | | 8083 | 52 |
| | | 8085 | 50 |
| | | 8085 | 50 |
| | | 8085 | 50 |
| | | 8096 | 39 |
| | | 8096 | 39 |
| | | 8096 | 39 |
| | | 8096 | 39 |
| | | 8096 | 39 |
| | | 8091 | 44 |
| | | 8091 | 44 |
| | | 8091 | 44 |
| | | 8091 | 44 |
| | | 8091 | 44 |
| | | 8093 | 42 |
| | | 8093 | 42 |
| | | 8093 | 42 |
| | | 8093 | 42 |
| | | 8093 | 42 |
| | | 8093 | 42 |
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| | | 8093 | 42 |
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| | | 8093 | 42 |
| | | 8093 | 42 |
| | | 8093 | 42 |
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|---|---|---|---|
| | | 8093 | 42 |
| | | 8093 | 42 |
| | | 8091 | 44 |
| | | 8091 | 44 |
| | | 8091 | 44 |
| | | 8097 | 38 |
| | | 8097 | 38 |
| | | 8097 | 38 |
| | | 8097 | 38 |
| | | 8097 | 38 |
| | | 8097 | 38 |
| | | 8097 | 38 |
| | | 8097 | 38 |
| | | 8097 | 38 |
| | | 8097 | 38 |
| | | 8100 | 35 |
| | | 8100 | 35 |
| | | 8100 | 35 |
| | | 8100 | 35 |
| PXBA | 0 | | |
| Q2H4 | 4 | **6296** | **570** |
| | | 7198 | 302 |
| | | **7197** | **303** |
| | | **7308** | **192** |
| Q4V7 | 5 | **7282** | **218** |
| | | 8119 | 16 |
| | | 7295 | 205 |
| | | 7295 | 205 |
| | | 7295 | 205 |
| | | 7295 | 205 |
| | | 8119 | 16 |
| | | **7281** | **219** |
| | | **7281** | **219** |
| | | 7281 | 219 |
| | | 7281 | 219 |
| | | **6352** | **514** |
| | | **7044** | **456** |
| | | 7268 | 232 |
| | | **7268** | **232** |
| | | 7268 | 232 |

| | | | |
|---|---|---|---|
| | | 8119 | 16 |
| | | **7280** | **220** |
| | | 7253 | 247 |

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